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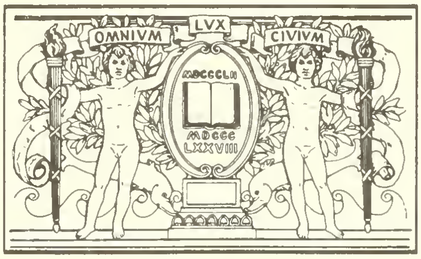

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BACK BAY

NEIGHBORHOOD TRANSPORTATION AND TRAFFIC ENGINEERING STUDY:

INITIAL REPORT

Prepared for:

BOSTON TRAFFIC AND PARKING DEPARTMENT
Boston, Massachusetts

Raymond L. Flynn
Mayor

Lisa G. Chapnick
Commissioner

Prepared by:

HMM Associates, Inc.
336 Baker Avenue
Concord, Massachusetts 01742

BACK BAY
NEIGHBORHOOD TRANSPORTATION AND TRAFFIC ENGINEERING STUDY

HMM Document No. 85-1103

June 1985

Prepared for:

BOSTON TRAFFIC AND PARKING DEPARTMENT

BOSTON, MASSACHUSETTS

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Mayor
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Commissioner

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1. INTRODUCTION

1.1 Background

Over the recent years, traffic issues within the Back Bay neighborhood of Boston have been of increasing concern, at the local, city-wide and regional levels. In the past few years several developments have opened in the area, including Copley Place and the State Transportation building, increasing the number of vehicle trips generated to and from the Back Bay area. In addition, several large development projects in the area are currently under construction, including the Four Seasons Hotel, One Exeter Place, and 399 Boylston Street.

In October 1984, a Draft Environmental Impact Report (EIR) was submitted to the Boston Redevelopment Authority for a proposed 1.3 million square foot mixed use development at 500 Boylston Street. Comments on the Draft EIR focused on transportation concerns related to automobile traffic, mass transportation, pedestrian circulation and safety. The comments were addressed in a Final EIR prepared in November 1984.

In April 1985, the Boston Redevelopment Board approved a Development Plan for the 500 Boylston Street project, under the following conditions:

> "That the Boston Redevelopment Authority Director request the Commissioner of Traffic and Parking to undertake a comprehensive traffic study of the Back Bay with recommendations and implementation measures which will:
>
> a) aim to reduce traffic levels on Berkeley Street, between Newbury Street and Storrow Drive;
>
> b) work towards overall reduction in the level of traffic in the area by 1987; and

c) examine improved vehicular access to the Southeast Expressway and the Central Artery.

1.2 Purpose of Study

The two primary purposes of this study are (1) to address the three issues identified by the Boston Redevelopment Board in April 1985, and (2) to develop a base for data and operating conditions which can be used for evaluating future development and transportation proposals within the Back Bay neighborhood.

Specifically, the following tasks were requested by the City to be included in this study:

- Basic 1985 volume data on each major roadway link and at each major intersection.
- Level of service analysis of each major link and each major intersection approach in a format which enables updating and substitution of numbers for planning purposes.
- 1985 inventory of existing conditions which affect traffic operations including lane use configurations, curb parking regulations, traffic control devices, existing driveways and access points, and off-street parking.
- Summary of 1985 major existing traffic generators with analysis of operational and directional characteristics.
- Summary of three year accident experience based on available data.
- Analysis of historic traffic trends for the 1975-1985 time period, including traffic volumes, parking policies, and parking supply and demand.

- Analysis of factors which might affect predictions of future traffic trends and procedures to be used in applying such factors.
- An analysis of existing pedestrian movements, including summaries of available volume data, qualitative analysis of pedestrian activities and recommendations regarding ways and means of producing a useful base for pedestrian data.
- An evaluation of existing air quality conditions including summaries of existing data and a qualitative analysis of the current status of air quality considerations.
- A 1985 inventory of other transportation modes available in the area and an analysis of their impact on the vehicle and pedestrian traffic.
- An analysis of the 1985 status of movement and delivery of goods in the Back Bay area.
- Definition of specific and general problem areas and general analysis of mitigating measures which might be applied, and the consequences thereof.
- Recommendations of remedial actions which might be implemented within a period of one year or less.
- Recommendations of remedial actions which might reasonably be implemented within a time period of three years or less.
- Recommendations of remedial actions which might be characterized as long-range for implementation, but which require the early initiation of planning and design work.

- Recommendations relating to transportation strategies to be adopted by the City in implementing future development proposals.

This neighborhood traffic study is being conducted in two phases. The first phase of the study was conducted during a 30-day period, and focused on (1) developing a 1985 baseline condition, (2) identifying transportation problems and issues in the Back Bay study area, and (3) developing initial recommendations for short range transportation actions and strategies which can be undertaken by the Boston Traffic and Parking Department and/or other public and private agencies to implement improvements to traffic operations in the Back Bay. Although preliminary intermediate and long-range alternatives were reviewed, the detailed evaluation of these actions and strategies will be conducted in the second phase of this study.

The following report presents the results of this first phase or initial study, which is not intended to be a final document, but rather a summary sufficiently complete to support policy level deliberations on initial recommendations. The preliminary recommendations presented herein have been based upon an analysis of existing conditions, a review of future development proposals, and discussions with city, state and neighborhood individuals. A Neighborhood Working Committee was formed to provide input during the initial study, discuss local concerns, and identify key transportation problems in the area. A list of the Working Committee members is presented in Appendix 1.

Subsequent to a review of the initial report, a final document will be prepared addressing issues and concerns raised on the initial report. It is anticipated that additional data collection and more detailed analyses will be conducted for specific transportation actions and strategies as part of the second phase of this project, prior to the preparation of the final report.

1.3 Sources of Data

In the recent past there have been numerous transportation-related studies conducted within the Back Bay area. In addition, recent studies conducted by the City, state agencies, and private concerns have included assessments of portions of the Back Bay area. The following is a list of recent reports which were reviewed during the initial stages of this study.

- "500 Boylston Street Draft Environmental Impact Report," Skidmore, Owings & Merrill, et al., October 1984.
- "500 Boylston Street Final Environmental Impact Report," Skidmore, Owings & Merrill, et al., February 1985.
- "Hynes Auditorium Draft Environmental Impact Report," HMM Associates, August 15, 1984.
- "Hynes Auditorium Final Environmental Impact Report," HMM Associates, November 15, 1984.
- "Transportation Review of the 500 Boylston Street Development," Stephen H. Kaiser, May 1985.
- "Transportation Review of the 500 Boylston Street Development, Stephen H. Kaiser, Revised June 1985.
- "Cordon Count 1982 - Downtown Boston," TAMS, 1982.
- "Parking in Central Boston: Meeting the Access Needs of a Growing Downtown," Cambridge Systematics Inc. with Vanasse/Hangen Associates, December 1983.

- "Boston Region - MBTA Systemwide Passenger Data Collection Program," CTPS, Revision April 15, 1980.

- "Copley Place Final EIR/EIS," HMM Associates, September 22, 1980.

- "Corridorwide Traffic Program - Southwest Corridor Project," Kaiser Engineers, Inc./Fay, Spofford & Thorndike, Inc.," August 1979.

- "Proposed Areawide TOPICS Plan - Downtown Boston, Massachusetts, Area No. 7," TAMS, November 1971.

- "Supplement to the Draft Environmental Impact Statement/Report - Third Harbor Tunnel, Interstate 90/Central Artery, Interstate 93," FHWA-MA-EIS-82-02-0S, June 1983.

- "Beacon Hill Neighborhood Transportation Planning Study," Boston Traffic and Parking Department, February 1985.

- "Boylston Street Zoning Study, An Interim Report," BRA, March 22, 1985.

- "Back Bay - Beacon Hill - Bay Village District Profile and Proposed 1979-1981 Neighborhood Improvement Program," BRA, 1979.

2. STUDY AREA

2.1 Study Area Boundaries

The transportation study area generally includes the Back Bay portion of the City of Boston and follows the following approximate boundaries (refer to Figure 2.1):

- On the East, Charles Street;
- On the North, Storrow Drive;
- On the West, Massachusetts Avenue;
- On the South, Huntington Avenue, Columbus Street, and Chandler Street.

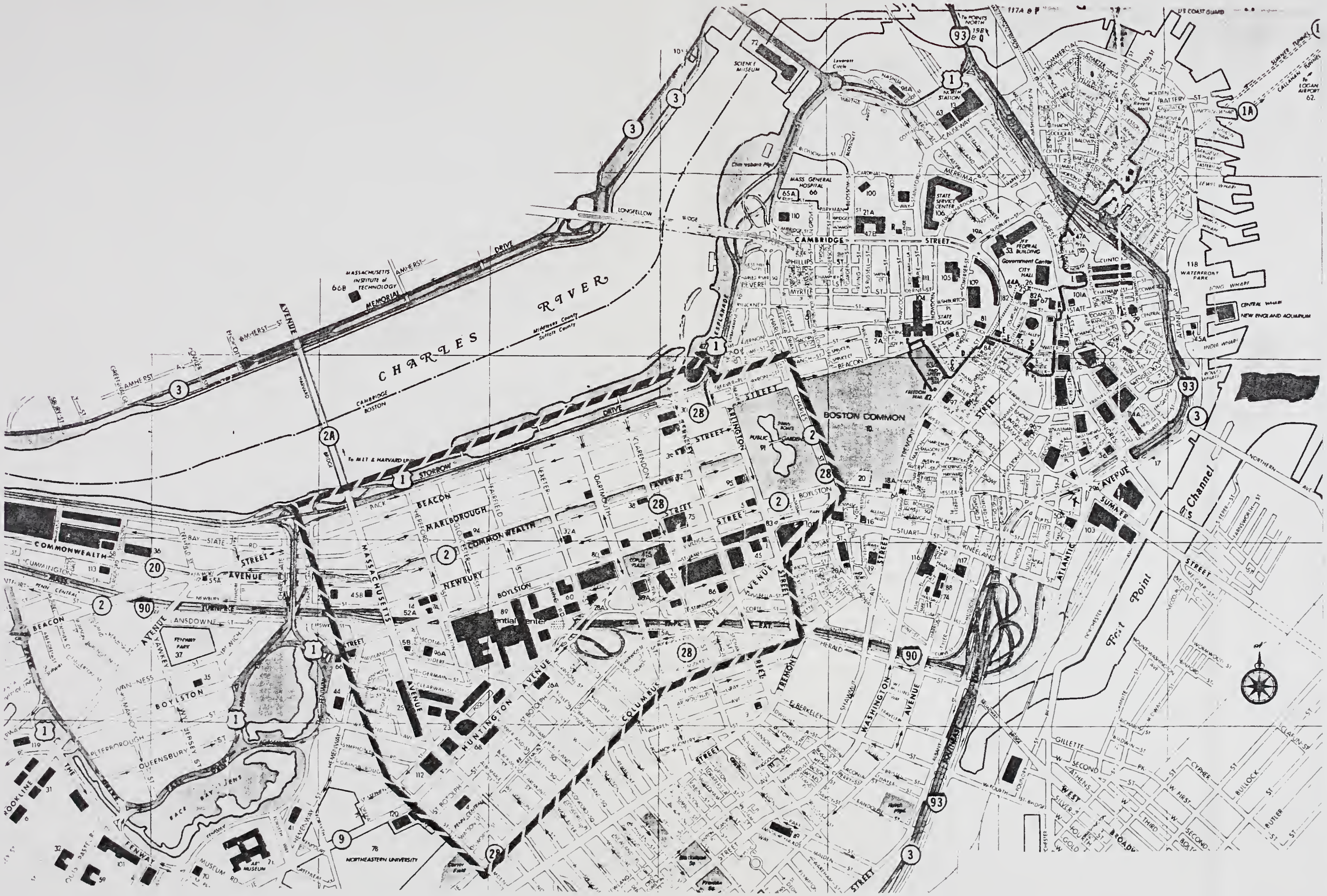
2.2 Study Area Land Use

The Back Bay is comprised of mixed land uses typical of an urban location. Multi-unit residential buildings co-exist with commercial land uses, including office and retail space. In addition, supporting land uses such as open space/recreation, institutional (library, schools, medical clinics), and parking facilities exist throughout the study area.

All of these land-use categories generate vehicular traffic. However, each has different types of users and trip generation characteristics.

2.2.1 Residential

The majority of buildings in the Back Bay are historic residential structures, occupied since the mid-1800s. These include the old 4-6 story buildings along Beacon Street, Marlborough Street, and Commonwealth Avenue, as well as the crossing streets. Old residential space also exists on upper



Study Area

Boundaries

▰▰ Study Area Boundary

FIG. 2.1

floors of Newbury Street buildings. In addition, several large newer residential structures exist or are proposed. These include the Hereford, Gloucestor and Fairfield Buildings in the Prudential Complex, the residences at Copley Place, Tent City, Arlington/Hadassah, Four Seasons Hotel, and Exeter Towers. These large developments bring significant numbers of new residents to the Back Bay. The renovation of older buildings, such as The Somerset on Commonwealth Avenue, will serve to increase the residential population of the Back Bay in the future.

It is difficult to assess the existing trip generation rate associated with residential use in Back Bay. Due to the urban nature of the area, major employment opportunities are nearby. In fact, a significant attraction for downtown living is the proximity of one's job. It can be assumed that a significant portion of Back Bay residents walk or take public transportation to their jobs. Those who drive are most likely commuting in the opposite direction of typical commuting patterns as they leave the area in the morning and return in the evening.

2.2.2 Commercial

Retail

Commercial development in the Back Bay is significant. It includes retail space as well as office space. Retail uses are concentrated along Newbury Street and Boylston Street at street and basement levels. These areas, comprised of small specialty shops, have existed for many years. As a result, Back Bay, and particularly Newbury Street, has long been a primary destination for both local and regional shoppers.

Retail space in Back Bay has expanded during recent years, now occupying several floors in many Newbury Street buildings. However, the major contributors to this expansion have been the shopping concourses in the Prudential Center, and the Shopping

Galleries at Copley Place. These newer developments have expanded the number of small shops, and introduced large chain department stores (Lord & Taylor, Saks Fifth Avenue, Neiman Marcus) to the Back Bay retail market.

The new retail development in Back Bay serves to strengthen the area as a shopping destination, thus encouraging more vehicular trips to the area. These trips, however, are unlikely to arrive during the peak morning hour or depart during the peak evening hour. It is likely that these visitors, who can schedule their trip at their option, will seek to avoid the periods of maximum congestion. New employees at these establishments may, however, contribute to peak hour traffic.

Office

Office space in the Back Bay is located almost exclusively on or south of Boylston Street. Along Boylston Street, office-type uses are generally located on upper levels of buildings with retail uses at street level. Historically, these buildings include 4-8 stories and are generally 25 to 50 feet wide, with the wider buildings being the taller ones.

Major interruptions in this scale of development have occurred in newer construction, as the scale of buildings has increased significantly. Larger buildings began with the construction of the John Hancock Building and New England Life Building. The Prudential and Hancock Towers, representing the maximum scale of office construction in Back Bay, are located south of Boylston Street along the "High Spine" identified in early city plans.

Modern day developments and proposals for office space in Back Bay represent higher density use than historic Boylston Street, but do not match the extreme levels of the Prudential and Hancock developments. These developments include Copley Place, 500 Boylston Street, 675-91 Boylston Street, 543-47 Boylston Street and 535-41 Boylston Street, and others. The

continued development of these larger structures, with floor area ratios (FAR's) exceeding 9, will intensify the commercial use of the Back Bay.

It is this type of land use that causes the most pronounced impact on vehicular circulation in the area. Persons employed within these buildings generally arrive and depart during the peak AM and PM hours, respectively, following the major commuter directional distribution patterns.

Hotel

Hotels are the other major category of commercial use in the Back Bay. The Copley Square Hotel and Hotel Lenox have existed in the Back Bay for many years. It has only been recently that a spurt of hotel development has made Back Bay a major area of hotel accommodations, boasting over 5,000 rooms. Newer hotels incude the Sheraton, Marriott/Copley, Westin/Copley, Back Bay Hilton, Colonnade, and Four Seasons.

Hotels generate trips primarily when a convention or meeting is held at the facility. Generally, it is the area the hotel serves (Back Bay) that will generate trips, since the businesses in the area attract the hotel guests. Guests may arrive by private auto, taxi, or public transit. However, vehicle arrival and departure patterns are not as problematic as those associated with office development.

2.2.3 Institutional

The major institutional uses in the Back Bay include the Boston Public Library (BPL), churches, schools, and the Hynes Convention Center. The Library and the Hynes are both located on Boylston Street. Both facilities can be significant trip generators, drawing visitors from a regional area.

Library

The BPL visitors may arrive by transit, private auto, or on foot. Many users of the BPL are City residents, while others make a specific trip to the facility from outside the area.

Hynes

Vehicle trip generation associated with the Hynes Convention Center varies drastically depending upon the type of event occurring. While a national convention may generate few trips as visitors stay at local hotels, a consumer show such as the Home Show can generate significant traffic volume.

Schools

There are several types of schools in the Back Bay. These include Boston public schools, private primary and secondary schools, and schools providing higher education. Schools are scattered throughout the area. Public or private primary and secondary schools are not expected to generate traffic, since students do not drive and are drawn from the local area. Institutions of higher learning may generate some traffic, but it is probably limited somewhat due to the impact of expensive parking on a student's budget, and the availability of public transportation.

Churches

There are churches scattered throughout the Back Bay. These are not major generators of traffic since congregations are generally made up of local residents. In addition, any vehicles making a trip to church on Sunday would not impact the peak commuter hours.

2.2.4 Parking

Parking is a major land use in the Back Bay. Parking facilities inlcude on-street parking (visitor and resident spaces), private alley parking, public garages, surface lots, and private garages. There are currently upwards of 10,000 off-street parking spaces in Back Bay. Many of these spaces are not available to the public, such as alley spaces and private facilities like the Harvard Club lot, Christian Science Church, etc. About 6,000 spaces are available for public use.

Public parking areas are dominated by several large garages. These include the Prudential, by far the largest with 2,205 spaces, Copley Place (856 spaces), Cheri (501 spaces), and Danker & Donahue (500 spaces). Other facilities provide the remainder.

Garage and surface lot space lies almost exclusively in the commercial area, on Newbury or Boylston Streets, with the majority located in the large developments south of Boylston Street.

An ongoing debate questions the trip generation characteristics of parking facilities. In and of themselves, parking facilities do not generate traffic. Rather, trips are generated by the area served by the garage. However, if no parking is available, visitors to the area are forced to either choose alternate means of transportation or not make the trip.

3. EXISTING CONDITIONS

3.1 Roadway System and Circulation

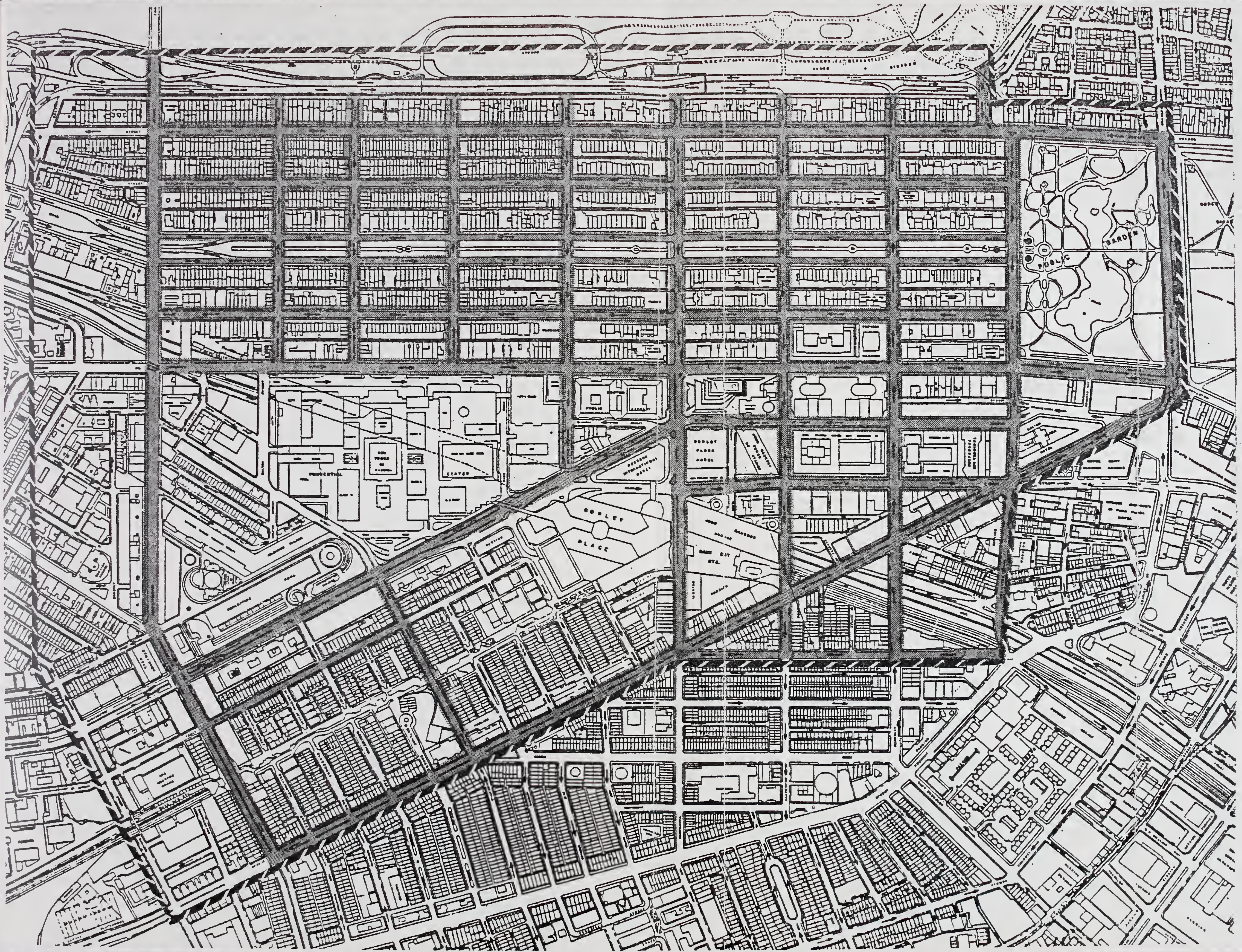
The street system in the Back Bay area is structured on a one-way grid system. The boundaries of the grid are Boylston Street to the south, Storrow Drive to the north, Massachusetts Avenue to the west and Charles Street to the east. Also, the roadways between Huntington Avenue and Columbus Avenue are in a grid pattern. In the Back Bay area the major east-west roadways are Beacon Street, Commonwealth Avenue and Boylston Street. Major north-south roadways include Charles, Arlington, Berkeley, Clarendon and Dartmouth Streets, and Massachusetts Avenue. Berkeley Street and Beacon Street via Embankment Road provide access to Storrow Drive from the Back Bay area. During the evening hours, when employees are leaving the area, the service conditions on these arteries become critical to the overall operating conditions of the Back Bay roadway system.

Traffic flow on most of the streets is one-way. Two way traffic exists on Columbus Avenue, Huntington Avenue, Massachusetts Avenue, St. Botolph Street and Commonwealth Avenue. The direction of one-way traffic flow alternates on adjacent streets both in the east-west direction and the north-south direction.

Access and egress to the Back Bay area includes several regional highways; the Massachusetts Turnpike Extension, Storrow Drive, Huntington Avenue (Route 9), and the Southeast Expressway (I-93) via Massachusetts Avenue. The roadway system evaluated in this initial study is illustrated on Figure 3.1.

3.2 Traffic Control Inventory

An inventory of existing traffic control information for the Back Bay area has been compiled. The following items have been collected and summarized in Appendix 2:



Study Area Roadways

FIG. 3.1

- signalized intersections;

- stop signs;

- snow emergency arteries;

- loading zones; and

- tow zones.

3.3 Existing Traffic Flows

PM peak hour turning movement counts (1983 and 1984) presented in the Hynes Auditorium EIR* and the 500 Boylston Street EIR,** were used in conjunction with recent PM peak hour counts taken by the City of Boston, to develop a 1984 PM peak hour traffic flow base. PM peak hour turning movement counts were taken during June of 1985 by HMM Associates at the following intersection locations:

- Beacon Street at Arlington Street and Embankment Road;

- Berkeley Street at Back Street; and

- Berkeley Street at Stuart Street.

In addition, 1985 automatic traffic recorder (ATR) counts were taken for a one week period along Berkeley Street and Clarendon Street, north of Commonwealth Avenue. These 1985 manual and machine counts are presented in Appendix 3.

The 1985 counts were used to adjust the 1984 base to develop a 1985 PM peak hour turning movement base condition, which is also presented in Appendix 3. In general, the 1985 PM peak hour

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* "Hynes Auditorium Draft Environmental Impact Report," HMM Associates, November 15, 1984.

** "500 Boylston Street Draft Environmental Impact Report," Skidmore, Owings & Merrill, et al., October 1984.

counts are on the order of 5 to 10 percent higher than previous 1983 and 1984 volumes.

Berkeley Street and Clarendon Streets, two of the key north/south facilities within the area, currently accommodate an average weekday total of approximately 14,700 and 10,000 vehicles, respectively. Combined average weekday volume on these streets is about 24,700 vehicles. Clarendon Street experiences its heaviest hourly flow of about 800 vehicles during the morning peak period (i.e., 7:30 AM - 8:30 AM), while Berkeley Street experiences its heaviest hourly volume of approximately 1000 vehicles during the late afternoon peak period (i.e., 4:30 PM - 5:30 PM). These peaking characteristics reflect the nature and usage patterns of Clarendon Street as a roadway utilized primarily for inbound travel (i.e., toward Copley Place, Hynes Auditorium, etc.) and Berkeley Street as an outbound route (i.e., toward Storrow Drive).

A significant portion of PM peak hour traffic utilizes the following routing patterns for access to Storrow Drive:

- Boylston Street eastbound to Berkeley Street northbound; or
- Charles Street northbound to Beacon Street westbound.

3.4 Parking Inventory

Parking in downtown Boston is a primary concern to the shopper, visitor, resident and business owner alike. Parking in the downtown is at a premium. According to a recent City-wide survey,* on-street parking is fully used while off-street spaces are used to 93 percent of capacity at peak

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* "Parking in Central Boston: Meeting the Access Needs of a Growing Downtown," Cambridge Systematics with Vanasse/Hangen Associates, December, 1983.

(12:00 Noon to 2:00 PM) times. However parking demands are not uniform and vary by type of parker and location in the City. Long-term or commuter parking tends to be located in off-street facilities while on-street parking gnerally accommodates high turnover shopper parking.

Off-Street Parking

Physical inventories of off-street parking spaces in the Back Bay area were conducted as part of the Hynes Auditorium and 500 Boylston Street EIR's.* These field investigations revealed a total of approximately 12,104 off-street parking spaces, of which approximately 7,316 (60 percent) are available for public use. The remaining 4,788 spaces (40 percent) are divided among customer reserved spaces, private employee spaces, restricted residential parking and hotel guest spaces. Table 3-1 summarizes the off-street inventory for the study area by facility, capacity and usage.

The results of the parking survey illustrate that off-street parking demand within the study area fluctuates significantly depending upon time of day, day of week and whether or not there is activity at the Hynes Auditorium.

Figure 3.2 depicts the Back Bay study area and identifies the major public and private parking lots and garages. Observations from the 1983 parking study conducted for the City** indicated that around 10:00 AM there was a surplus of about 525 off-street parking spaces in the Back Bay area. Around noon, the surplus decreased to approximately 475 spaces.

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* "Hynes Auditorium Draft Environmental Impact Report," HMM Associates, August 15, 1984; "500 Boylston Street Draft Environmental Impact Report," Skidmore, Owings & Merrill, et al, October 1984.

** "Parking in Central Boston: Meeting the Access Needs of a Growing Downtown", Cambridge Systematics with Vanasse/Hangen Associates, December 1983.

TABLE 3.1

BACK BAY OFF-STREET PARKING INVENTORY

Index Number	Name or Address of Facility	Type of* Lot	Capacity
1	424 Beacon Street	PR	32
2	330 Beacon Street	PRG	72
3	256 Beacon Street	PR	11
4	236 Beacon Street Apartments	PR	18
5	330 Commonwealth Avenue	PRG	20
6	60 Marlborough Street	P	12
7	299 Berkeley Street	PR	17
8	Danker & Donahue Garage	PG	500
9	Alley 434	PR	14
10	278-284 Dartmouth Street	P	71
11	Ritz Condominiums Garage	PRG	50
12	354 Newbury Street	PG	27
13	939 Boylston Street	PR	22
14	Sunoco Gas Station	P	25
15	200 Newbury Street	P	50
16	178-180 Newbury Street	NA	50
17	683-691 Boylston Street	NA	71
18	80 Newbury Street	PRG	80
19	60 Newbury Street	PR	41
20	4 Newbury Street	PRG	130
21	Alley 438	PR	11
22	Auditorium Garage	PG	501
23	Back Bay Hilton	PRG	265
24	Prudential Center	PRG	220
25	Prudential Center	PG	1173
26	Prudential Center	PG	894
27	Blagden Parking Lot	P	60
28	Copley Place and Marriott Hotel	PRG	275
29	St. James Garage	PG	625
30	St. James Avenue	PR	30
31	30 Stuart Street	PR	30
32	Motor Mart Parking Garage	PG	900
33	101 Belvidere Street	PRG	550
34	Midtown Motor Inn	PRG	145
35	156-186 Huntington Avenue	PRG	210
36	Colonnade Garage	PG	275
37	Garrison Hall	PR	18
38	7-23 Follen Street	PR	20
39	30 Garrison Street	PR	28
40	Braddock Park	PR	38
41	Columbus Avenue	PR	28

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* P - Public Lot　　PG - Public Garage
PR - Private Lot　　PRG - Private Garage
NA - Not Available from 1983 Study

Source: "Parking in Central Boston: Meeting the Access Needs of a Growing Downtown," Cambridge Systematics, Inc. with Vanesse/Hangen Associates, December 1983.

TABLE 3.1 (Cont'd)
BACK BAY OFF-STREET PARKING INVENTORY

Index Number	Name or Address of Facility	Type of* Lot	Capacity
042	Copley Place and Marriott Hotel	PRG	307
43	Copley Place and Marriott Hotel	PG	860
44	21 Yarmouth Street	P	10
45	104-106 Dartmouth Street	P	23
46	12-30 Truro Street	P	36
47	25-29 Yarmouth Street	P	61
48	130 Dartmouth Street	P	68
49	John Hancock Garage	PRG	1010
50	John Hancock Garage	PG	774
51	35 Buckingham Street	PG	56
52	National Garage, Inc.	PR	80
53	National Garage Inc.	PR	410
54	400-406 Stuart Street	PRG	77
55	Stuart Street	P	30
56	380 Stuart Street	PR	16
57	Alley 559	PR	10
58	Stanhope Garage	PR	52
59	75 Clarendon Street	P	70
60	Appleton Street	P	17
61	187 Columbus Ave	PR	35
62	Stuart Street Armory	PR	80
63	174-188 Columbus Ave	PRG	22
64	107-127 Arlington Street	PR	84
65	206 Columbus Ave	P	52
66	40 Isabella Street	P	30
67	Cortes Street	PR	17
68	57-75 Berkeley Street	PR	10
69	Chandler Street	PR	10
70	9 Appleton Street	PR	16
71	Tremont Street	PR	56
72	66-72 Church Street	P	62
73	130-132 Arlington Street	P	54
		TOTAL	12,104

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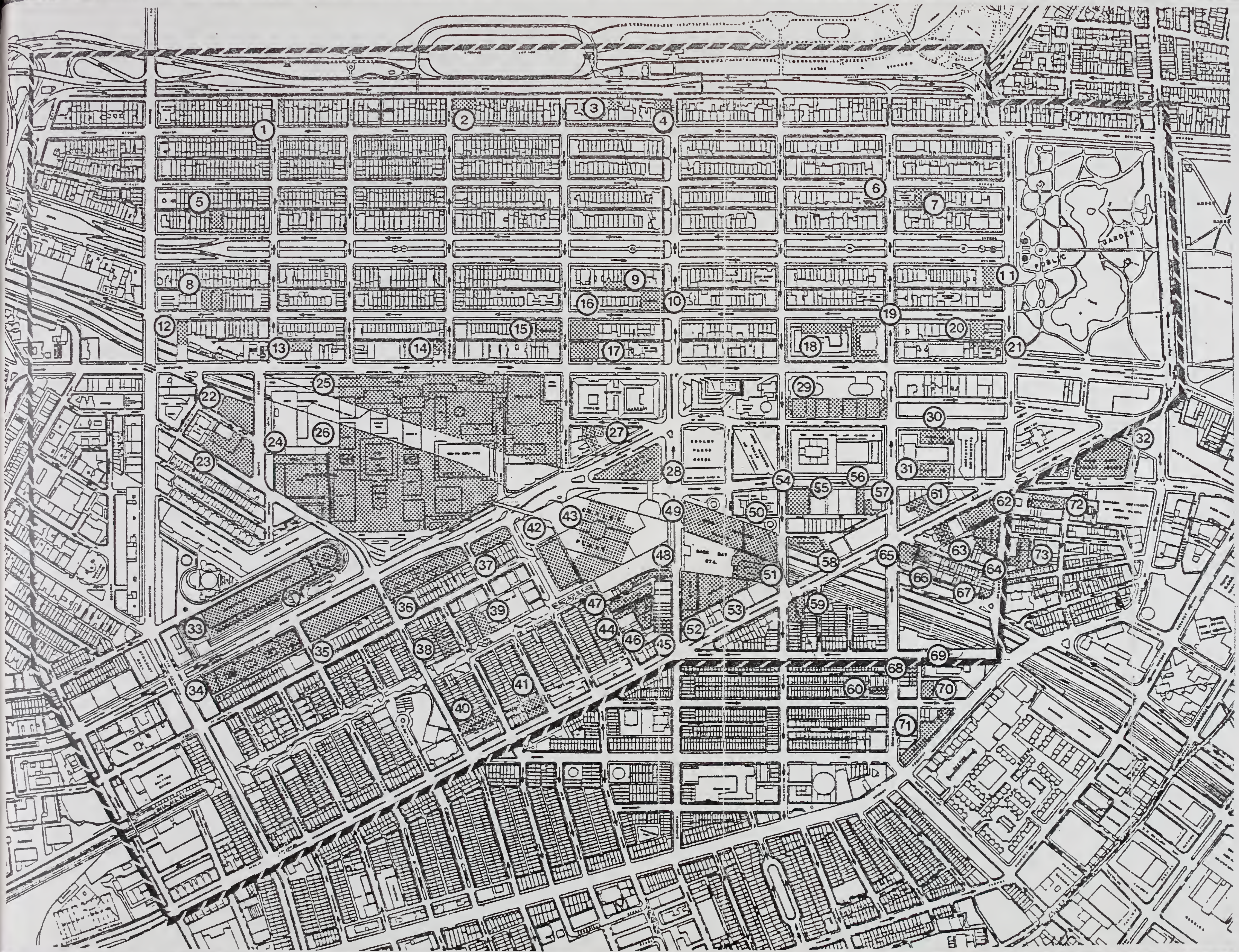
* P - Public Lot PG - Public Garage
PR - Private Lot PRG - Private Garage
NA - Not Available from 1983 Study

Source: "Parking in Central Boston: Meeting the Access Needs of a Growing Downtown," Cambridge Systematics, Inc. with Vanesse/Hangen Associates, December 1983.



Location of Off-Street Parking Facilities

▬ ▬ Study Area Boundary

▨ Parking Facilities

NOTE: Numbers correspond to index numbers in Table 3.1

0 250 500
Approx. Scale in Feet

FIG. 3.2

On-Street Parking

As part of the 1983 parking study, parking counts showed that approximately 6,266 cars were parked in the Back Bay area at 10AM and by noon this number had increased to 6,569. Both of these volumes are well over the 2,231 estimated number of meters in the area at the time of the study (1982).

The on-street parking turnover study for the City of Boston demonstrated that the overall average turnover rate was 2.6 cars per space between 10 AM and 5 PM. This indicates that the majority of both legal and illegal on-street parkers do not park all day. However, 1985 observations indicate that many on-street parkers do, in fact, park all day.

3.5 Goods and Service Deliveries

At the present time, truck and automobile deliveries and service calls are made to the various commercial establishments throughout the course of the day. Loading zones are available at various locations, although observations indicate that many of the loading zone spaces are currently being used by long-term parkers. Consequently, delivery and service vehicles frequently double-park while making deliveries. This results in traffic flow restrictions and is particularly evident along Newbury Street, from Clarendon Street to Massachusetts Avenue.

3.6 Pedestrian Circulation

Pedestrian traffic is most significant in areas adjacent to major office buildings, hotels, retail stores and transportation facilities. Major pedestrian corridors within the study area include Boylston Street, Berkeley Street, Arlington Street, Newbury Street, St. James Avenue, Stuart Street and Huntington Avenue. All pedestrian crossings at major signalized intersections include pedestrian actuated controls. Back Bay Station will attract a significant number

of pedestrians upon completion of the Orange Line relocation project and thus Dartmouth and St. James Streets will exhibit higher pedestrian levels in the future.

Large pedestrian crossing volumes occur at the intersections of Boylston Street at Berkeley Street, Boylston Street at Arlington Streelt, Boylston Street at Clarendon Street and Boylston Street at Dartmouth Street. In Copley Square and along Boylston Street, in general, pedestrian activity remains high through most of the day, particularly during the lunch period. Pedestrian flows associated with Hynes Auditorium are primarily oriented to and from nearby hotels, public transportation stations, and parking facilities in and around the area.

3.7 Mass Transportation

The Back Bay is serviced by public transportation, including MBTA rapid transit, commuter rail and public and private bus lines. These modes of transportation, shown on Figure 3.3, are described below.

3.7.1 Rapid Transit

Back Bay is currently served by the MBTA's Green Line. A second subway line, the Orange Line, is being constructed along a route which will also provide service to the Back Bay at Back Bay Station. The Back Bay Station is schedule to open in December of 1986, serving both Orange Line and Commuter Rail operations.

Green Line

As shown on Figure 3.3, the Green Line travels through the Back Bay following a general path under Boylston Street, making three stops; Boylston, Arlington and Copley. At Copley, the Arborway branch (E) of the Green Line departs, providing

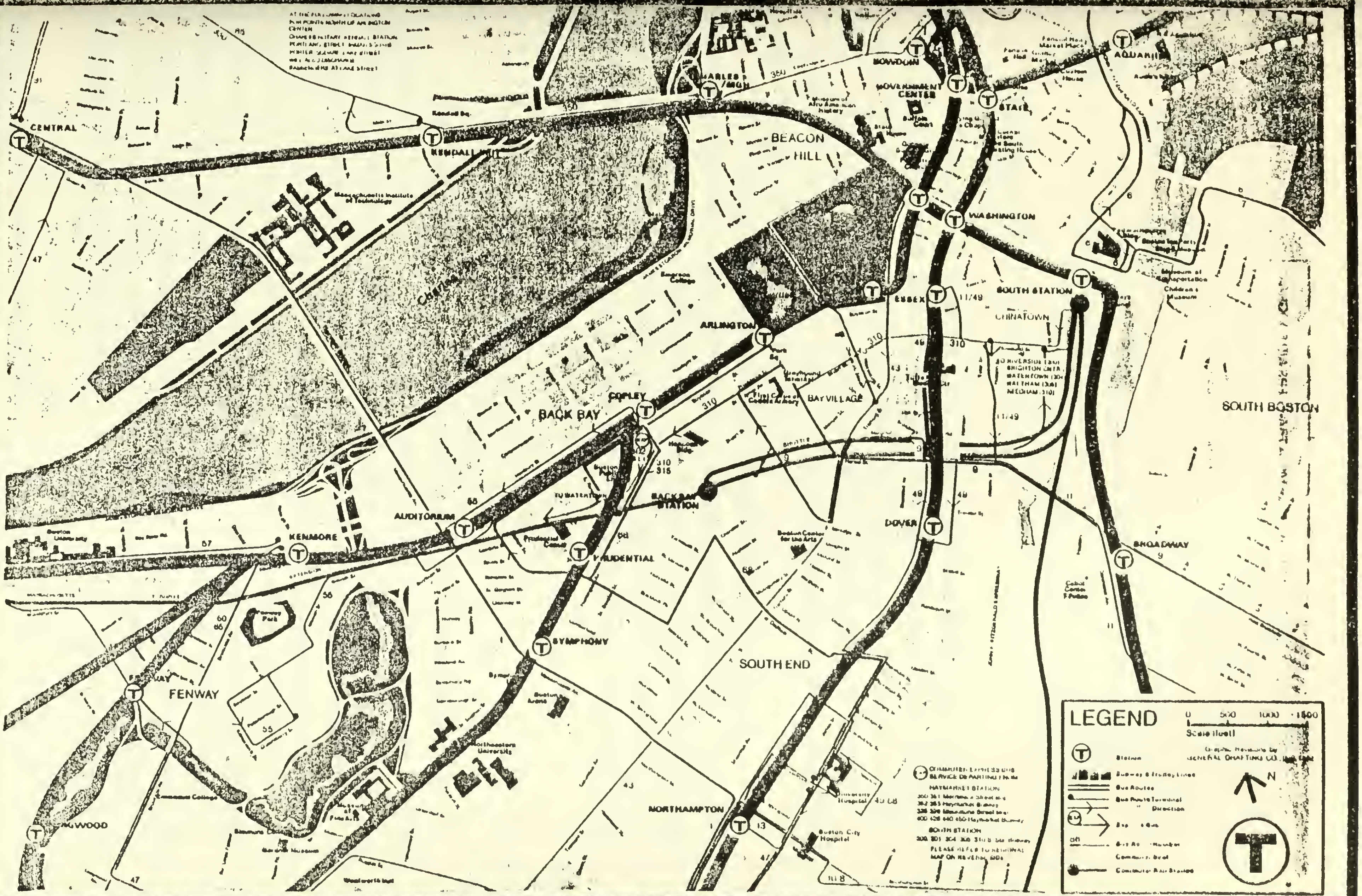


FIG. 3.3 Mass Transportation Servicing the Back Bay Area

service to the Prudential and Symphony Stations in Back Bay. The main branch of the Green Line continues along Boylston Street to Auditorium Station, and then to Kenmore Square just west of the study area. From Kenmore, the Green Line makes three branches serving Commonwealth Avenue to Boston College, Beacon Street to Cleveland Circle, and the inner western suburbs along the Riverside Line.

Orange Line

Although the Orange Line does not now provide service to the Back Bay, the new Southwest Corridor project currently under construction will relocate the line as shown on Figure 3.3. Service will be provided to the Back Bay Station on Dartmouth Street. Service on the relocated Orange Line is expected to start in late 1986.

This major transportation project offers a real opportunity for improved mass transportation service to the study area. When completed, service on the relocated Orange Line will offer improved service to the inner northeast and southwest suburbs, including the Jamaica Plain and Hyde Park sections of Boston.

3.7.2 Commuter Rail

The commuter rail station in Back Bay is located on Dartmouth Street opposite the new Copley Place complex. This station serves the Framingham Branch of the commuter rail system, covering Newton, Wellesley, Natick and Framingham. In addition, it serves the Franklin, Stoughton and Providence Branches and also the Forest Hill and Needham branches. Although service on these lines has been discontinued during Orange Line construction, it will be restored in the near future. These commuter line branches will connect easily to the Orange Line at the Back Bay Station, providing direct access to downtown Boston.

Use of these commuter lines during peak hours is constrained by capacity of the fleet. The MBTA is actively seeking to upgrade its rolling stock to increase capacity.

3.7.3 Bus Service

Extensive bus service to Back Bay is provided by the MBTA. There are currently seven separate routes serving the area, as shown on Figure 3.3. These routes are listed below.

#1	Harvard/Dudley
#9	City Point/Copley
#55	Queensberry/Park & Tremont Streets
#68	Boston City Hospital/Copley
#302	Watertown/Copley Express
#310	Needham/Copley Express
#315	Roslindale/Copley Express

The last three routes provide express service to the area from the suburbs. In addition, commuter service is provided by some private carriers.

For shoppers and sightseers, a short loop bus route utilizing a double-decker bus circulates between downtown Boston commercial areas and Back Bay. It should be noted that commercial vehicles, including buses, are banned from many Back Bay Streets. Buses generally must use Massachusetts Avenue, and Boylston Street to access the area. Buses do not utilize Newbury, Commonwealth, Marlborough or Beacon Streets, the crossing streets, or Storrow Drive.

3.8 Accidents

The Boston Traffic and Parking Department is currently collecting available accident statistics from the Massachusetts Department of Public Works and City of Boston Police

Department. The data will be evaluated and presented in the subsequent final report.

3.9 Air Quality

National Ambient Air Quality Standards (NAAQS) for six pollutants have been established by the Federal Clean Air Act designed to protect both public health and welfare. Of these six pollutants, four are emitted by motor vehicles or formed from their emission: carbon monoxide (CO), nitrogen oxides (NO_x), ozone (O_3), and lead (Pb). Federal standards for these four pollutants are presented in Table 3.2. Standards for the Commonwealth of Massachusetts are identical to the Federal standards. The primary standards are intended to protect public health, while secondary standards are designed to protect the public welfare from any unknown or anticipated adverse effects. The target date for attainment of national and secondary standards in Massachusetts is December 31, 1987.

Existing air quality in the Back Bay project area was estimated based on the Commonwealth of Massachusetts' 1983 air quality monitoring program* (at Kenmore Square) and the BRA Environmental Impact Report for the 500 Boylston Street project.** Air quality data from the State's monitoring program* are presented and compared to the NAAQS in Table 3.2. This summary demonstrates violations of two of the NAAQS. For the eight-hour CO standard a level of 12 mg/m^3 was measured which is 2 mg/m^3 above the standard (10 mg/m^3). In addition the measured one-hour ozone level of 0.110 ppm exceeded the one-hour standard of 0.08 ppm. All other levels in Table 3.2 are below allowable standards.

Existing levels of carbon monoxide in the Back Bay project area were further examined based on results from the air quality analysis for the 500 Boylston Street project. This

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* Commonwealth of Massachusetts, 1983 Air Quality Data Report, Division of Air Quality Control, Boston, Massachusetts.

TABLE 3.2

NATIONAL AND MASSACHUSETTS AMBIENT AIR QUALITY STANDARDS AND EXISTING LEVELS

Pollutant	Type of Average	Primary Standard	Secondary Standard	Existing Concentration
Carbon Monoxide (CO)	*Maximum 8-Hour Average	10 mg/m^3 (9 ppm)	Same	12 mg/m^3 (10.4 ppm)
	*Maximum 1-Hour Average	40 mg/m^3 (35 ppm)	Same	18 mg/m^3 (15.7 ppm)
Photochemical Oxidants Measured As Ozone (O_3)	*Maximum 1-Hour Average	160 ug/m^3 (0.08 ppm)	Same	0.110 ppm**
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	100 ug/m^3 (0.05 ppm)	Same	51 ug/m^3
Lead (Pb)	3 Months	1.5 ug/m^3	Same	0.56 ug/m^3

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* Not to be exceeded more than once per year.

** 340 Breman Street Monitoring Station.

study calculated one and eight-hour CO levels at nine sensitive locations in Back Bay. A summary of results for the year 1984 is presented in Table 3.3 and indicates a number of potential violations of both the one and eight-hour CO standards in the project area. From this analysis, peak one-and eight-hour CO levels of 49.6 ppm and 18.0 ppm, respectively, were predicted at the intersection of Berkeley Street and Columbus Avenue. These represent levels well above Allowable Standards.

The results presented demonstrate that, in addition to the federally regulated yearly emission reductions required of automobile manufacturerers, other mitigation measures may be required to reduce CO levels in the Back Bay area. Such measures may include changing intersection geometry to increase motor vehicle capacities and optimizing signal timings. Reduction of the existing circuitous travel along Newbury and Boylston Streets and reduction in the number of double-parked, idling cars would also be measures to improve air quality in the area.

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* "500 Boylston Street Draft Environmental Impact Report", Skidmore, Owings & Merrill, et. al., October 1984.

TABLE 3.3

PREDICTED CO LEVELS (PPM) AT SENSITIVE LOCATIONS IN BACK BAY AREA*

	1984 Concentrations		NAAQS	
Intersection	1-Hour	8-Hour	1-Hour	8-Hour
Arlington/Columbus	33.0	13.7	35	9
Berkeley/Beacon	42.9	13.5	35	9
Berkeley/Commonwealth	28.7	13.1	35	9
Berkeley/Boylston	38.4	13.0	35	9
Berkeley/St. James	37.7	13.9	35	9
Berkeley/Columbus	49.6	18.0	35	9
Clarendon/Boylston	24.1	9.2	35	9
Dartmouth/St. James	29.8	10.9	35	9
Dartmouth/Columbus	23.3	8.2	35	9

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* Based upon data presented in "500 Boylston Street Draft Environmental Impact Report", Skidmore, Owings & Merrill, et. al., October 1984.

4. EXISTING TRANSPORTATION OPERATIONS

4.1 Traffic Operations

The 1985 PM peak hour traffic volumes were used to develop volume-to-capacity (V/C) ratios and level-of-service (LOS) determinations at 29 intersection locations within the study area. LOS is a measure of the quality of traffic flow along roadway sections or at intersections. LOS designations range from A through F, with LOS A representing free-flow conditions, LOS E representing operations at or near capacity, and LOS F representing forced-flow conditions.

The capacity of an intersection or roadway facility is the maximum number of vehicles which can progress along a roadway segment and/or intersection approach, given the physical and operational characteristics of the facility. The relationship between V/C ratios and LOS designations is summarized in Table 4.1. This table also indicates typical ranges of average stopped vehicle delays associated with the various LOS designations.

From a traffic operations standpoint, LOS C or better is generally considered an "acceptable" condition. LOS D may also be acceptable and represents conditions where the peak hour demands are less than the capacity of the roadway or intersection, but where speeds are considerably reduced and delays increased. LOS E, generally considered not acceptable, represents operations at or near capacity where delays to critical approaches may be significant.

Standard procedures and practices outlined in the "Highway Capacity Manual,"* and "Interim Materials on Highway Capacity"** were used to evaluate peak hour operations at the previously identified study area intersection locations. Table 4.2

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* "Highway Capacity Manual," Highway Research Board Special Report 87, National Academy of Sciences, 1965.

** "Interim Materials on Highway Capacity," Transportation Research Circular 212, Transportation Research Board, National Academy of Sciences, January 1980.

TABLE 4.1

LEVEL OF SERVICE (LOS) DESIGNATIONS*

Category	Description	Typical Volume/ Capacity Ratio
LOS A:	describes a condition of free flow, with low volumes and relatively high speeds. There is little or no reduction in maneuverability due to the presence of other vehicles, and drivers can maintain their desired speeds with little or no delay.	0.00 - 0.60
LOS B:	describes a condition of stable flow, with operating speeds beginning to be restricted somewhat by traffic conditions.	0.61 - 0.70
LOS C:	describes a condition still representing stable flow, but speeds and maneuverability begin to be restricted.	0.71 - 0.80
LOS D:	describes a condition approaching unstable flow, with tolerable operating speeds being maintained through considerably affected by changes in operating conditions.	0.81 - 0.90
LOS E:	represents conditions at or near the capacity of the facility. Flow is unstable, and there may be significant delays.	0.91 - 1.00
LOS F:	describes forced flow operations with significant vehicle delays.	Varies

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* Sources: (1) "Highway Capacity Manual," Highway Research Board Special Report 87; National Academy of Sciences, 1965.

(2) "Interim Materials on Highway Capacity," Transportation Research Circular 212, Transportation Research Board, National Academy of Sciences, January 1980.

** Delay ranges relate to the mean stopped delay incurred by all vehicles entering the intersection and do not consider the effects of traffic signal coordination. Source: "Interim Materials on Highway Capacity," Transportation Research Circular 212, Transportation Research Board, National Academy of Sciences, January 1980.

TABLE 4.2

1985 PM PEAK HOUR OPERATIONS

	Intersection Location	1985 PM Peak Hour Operations Level of Service (LOS)	1985 PM Peak Hour Operations Volume-to-Capacity Ratio (V/C)
1.	Boylston Street @ Charles Street	A	.44
2.	Beacon Street @ Charles Street	D	.87
3.	Beacon Street @ Arlington Street	D	.83
4.	Arlington Street @ Commonwealth Avenue	A	.54
5.	Arlington Street @ Boylston Street	C	.75
6.	Arlington Street @ Stuart Street	E	.98
7.	Berkeley Street @ Columbus Avenue	A	.50
8.	Berkeley Street @ St. James Avenue	A	.57
9.	Berkeley Street @ Boylston Street	B	.68
10.	Berkeley Street @ Commonwealth Avenue	C	.71
11.	Berkeley Street @ Beacon Street	D	.83
12.	Beacon Street @ Clarendon Street	A	.39
13.	Clarendon Street @ Commonwealth Avenue	A	.58
14.	Clarendon Street @ Boylston Street	B	.67
15.	Clarendon Street @ St. James Avenue	B	.64
16.	Clarendon Street @ Columbus Avenue	B	.62
17.	Dartmouth Street @ Columbus Avenue	A	.57
18.	Dartmouth Street @ Stuart Street	A	.45
19.	Dartmouth Street @ St. James Avenue	C	.74
20.	Dartmouth Street @ Boylston Street	B	.62
21.	Dartmouth Street @ Commonwealth Avenue	A	.53
22.	Massachusetts Avenue @ Beacon Street	D	.88
23.	Massachusetts Avenue @ Commonwealth Avenue	B	.65
24.	Massachusetts Avenue @ Newbury Street	D	.84
25.	Massachusetts Avenue @ Boylston Street	D	.82
26.	Huntington Avenue @ West Newton Street	C	.73
27.	Columbus Avenue @ Appleton Street	C	.70
28.	Massachusetts Avenue @ St. Botolph Street	B	.67
29.	Massachusetts Avenue @ Huntington Avenue	B	.64

presents the LOS and V/C ratios for these locations, based on the PM peak hour counts developed as part of this study. Back-up calculations are presented in Appendix 4.

A review of Table 4.2 indicates that the majority of study area intersections operate within acceptable service levels (i.e., LOS C or better) during the PM peak hour. These locations operate with little or no restriction to left turning or cross traffic, except for delays imposed by the red phase of traffic signals. Almost all signalized intersection locations within the Back Bay study area include a standard three-phase signal system, with an actuated exclusive pedestrian phase.

Further review of Table 4.2 reveals that five key intersections which currently experience problems with traffic congestion and delay are Beacon Street at Charles Street; Beacon Street at Berkeley Street; Massachusetts Avenue at Beacon Street; Beacon Street at Arlington Street; and Arlington Street at Stuart Street. A description of existing PM peak hour operations at these locations are outlined below.

Charles Street at Beacon Street: This intersection operates at LOS D (V/C = .87) during the PM peak hour, and is very close to deteriorating further to LOS E. The critical flows at this location are the right turn movements from Charles Street onto Beacon Street from the north and south. The cumulative effect of these flows results in frequent congestion and delay at the intersection. Lane and directional pavement markings and/or signing is, for the most part, confusing or nonexistent, and creates additional problems at the site. The heaviest peak hourly flow at this intersection is the left turn from Charles Street northbound onto Beacon Street westbound, with approximatey 1250 vehicles performing this movement. However, the recently constructed traffic island within the intersection has minimized the potential conflict of these left-turning vehicles from Charles Street with through traffic along

Beacon Street. Although these movements are allowed to occur simultaneously under the existing 3-phase traffic signal with an exclusive pedestrian interval, this island permits vehicles utilizing the double left-turn lane on Charles Street to perform a virtual free movement onto two available lanes on Beacon Street, with a third lane available to accommodate the through traffic from the east.

Beacon Street at Berkeley Street: This intersection operates at LOS D (V/C = .83) during the PM peak hour and serves as the controlling location for traffic movement along Berkeley Street. The critical volumes approaching the intersection are the through and left-turn movement from the northbound approach along Berkeley Street and the through movement from the westbound approach on Beacon Street. At the present time, total volume along each intersection leg is similarly heavy, with the Berkeley Street approach servicing about 1350 vehicles and the Beacon Street approach serving 1340 vehicles. Traffic along Berkeley Street, meanwhile, is frequently queued for a noticeable distance upstream from the intersection. Visual observations indicate that vehicle queues at the Berkeley Street approach to this intersection frequently extend beyond the Berkeley Street/Commonwealth Avenue intersection toward the south. A large portion of the queueing along Berkeley Street is the result of the "spill-over" effects from conflicts at the immediately downstream Back Street/Berkeley Street intersection approaching Storrow Drive. These conflicts include lane changing, driver indecision, and associated weaving-type problems at the Storrow Drive ramps. The pavement along Berkeley Street, north of Beacon Street, is currently in poor condition. The paved surface is approximately 19-1/2 feet wide. A depression in the pavement on the right side of the roadway near an existing catchbasin also affects flow along this roadway section.

Massachusetts Avenue at Beacon Street: This intersection currently operates at LOS D (V/C = .88) while accommodating through and left-turning traffic on three approaches: northbound and southbound on Massachusetts Avenue; and westbound on Beacon Street. Right turns are made from the westbound and southbound legs of the intersection. Volumes are heavy along all approaches, with the intersection serving a total of approximately 3500 vehicles during the late afternoon peak hour period. The heaviest approach volume is from the north on Massachusetts Avenue and includes about 1300 vehicles. There is an advance green signal phase for traffic turning left from Massachusetts Avenue onto Beacon Street westbound. At times when this advance signal phase cannot accommodate all vehicles desiring to make this turn, there are numerous conflicts with through traffic from the north. There is also heavy pedestrian activity in the vicinity of this intersection. However, the advance green signal phase for the northbound approach permits pedestrians frequent and safe crossings of Beacon Street on the east side of the intersection.

Beacon Street at Arlington Street: This intersection operates at LOS D (V/C = .83), with frequent congestion and delay caused primarily by vehicle maneuvers along the westbound approach on Beacon Street. Vehicles "jockeying" (e.g., weaving) for position to access or avoid the Embankment Road ramp to Storrow Drive create conflicts at this site. The Beacon Street westbound approach to the intersection operates as two lanes, with the third lane partially blocked and not capable of serving its full quota of traffic. Some congestion and delay also occurs to vehicles using the two-lane Embankment Road off-ramp onto Beacon Street. These problems are mostly the result of pedestrian conflicts as well as conflicts with left-turning vehicles from the westbound approach. Visual

observations at the intersection indicated that the manually activated pedestrian-phase of the traffic signal was frequently in use, causing delays to vehicles along all approaches.

Arlington Street at Stuart Street: This intersection currently operates near capacity at LOS E (V/C = .98) during the late afternoon peak hour. Vehicles approach the intersection from four directions as follows: (1) from the north on Arlington Street; (2) from the northeast on Columbus Avenue; (3) from the west on Stuart Street; and (4) from the southwest on Columbus Avenue. The heaviest approach volume is along Arlington Street from the north, with a total of approximately 1,250 vehicles utilizing this roadway section. This approach contributes about 40% of the total critical lane volume at this site. Meanwhile, the Stuart Street approach contributes about 30% of this total critical intersection volume. The combined effect of left turns from the northeast and right turns from the southwest on Columbus Avenue (i.e., onto Arlington Street southbound) makes up the remainder of the critical volume. Vehicle flows are lighter on the Columbus Avenue approaches than on the Stuart or Arlington Street legs of this intersection.

The additional key intersection location of Boylston Street at Arlington Street has also been evaluated. The service level at this site is within an acceptable level, but is highly sensitive to the impacts of future development. A brief description of traffic operations and potential problems at this intersection is presented below.

Arlington Street at Boylston Street: During the PM peak hour, this intersection operates at LOS C (V/C = .75). There is a heavy through movement of nearly 1000 vehicles from the north on Arlington Street and from the west on Boylston Street, respectively. There are also approximately 650 vehicles making a left turn from Arlington Street onto Boylston Street eastbound. This intersection is currently being reconstructed. The full intersection improvements, scheduled for completion by the end of 1985, will significantly affect operations at this location and at the intersection of Boylston Street and Charles Street. Future operations at these two locations will be evaluated in more detail as part of the final study. Traffic flow at this location is controlled by a three-phase signal, including an exclusive pedestrian cycle. The cumulative effect of heavy approach volumes and pedestrian activity results in occasional congestion and delay beyond that incurred due to the normal signal cycle.

4.2 Mass Transportation

Subway rail transit operation is difficult to assess on a peak hour basis, due to varying conditions which occur on a day to day basis. Extended loading delays at certain stations and rail system problems (i.e., switching and track failures) typically have an impact on scheduled fleet headways, which may lead to more or less service to individual stations during peak hour periods. In addition, the concept of acceptable or tolerable rail system operating conditions is not as well defined as it is for highway systems. The concept of rail capacity is also a debatable item since the concept of acceptability in rail system operations is not well defined.

Based upon a review of recent studies conducted in the area, discussions with the Central Transportation Planning Staff and information published by the Transportation Research

Board, capacity and level of service designations for LRV's have been developed. The concept of rail transit level of service has not been applied extensively in transportation analyses. However, the concept has been explored as part of this study in order to attempt to better assess existing MBTA Green Line operations. The level of service designations used in this study are presented in Table 4.3.

One problem in assessing rail transit operations lies in defining capacity operations. Based upon available literature, HMM has defined three operational capacity levels for use in this study as follows:

- Comfortable Capacity (LOS E): The comfortable capacity is defined to represent a rail car passenger density which is tolerable to most passengers. An estimate of 125 passengers per LRV is used to define the upper end of this capacity designation.

- Peak Capacity (LOS E'): Peak capacity is defined to represent a level of passenger density where all passengers may not be comfortable, but conditions are tolerable to most. An upper value of 150 passengers per train car is used to define LOS E'.

- Crush Capacity (LOS F): The crush capacity is defined as a condition where virtually all passengers are uncomfortable and conditions are untolerable to many. An upper value of 190 passengers per train car is used to define LOS F.

It should be noted that these operational capacities are intended to be used as a planning tool, and that much more data and research is needed to develop specific information for detailed systems operations analyses.

TABLE 4.3: LEVELS OF SERVICE FOR RAIL TRANSIT[1]

Peak Hour Level of Service	Passengers/Seat[2]	Service Volume Per Rail Car[3]
A	0.00 - 0.65	0 - 33
B	0.66 - 1.00	34 - 50
C	1.01 - 1.50	51 - 75
D	1.51 - 2.00	76 - 100
E (Comfortable Capacity)	2.01 - 2.50	101 - 125
E' (Peak Capacity)	2.51 - 3.00	126 - 150
F (Crush Capacity)	3.01 - 3.80	151 - 190

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[1] Source: Derived from data presented in: "Interim Materials on Highway Capacity," Transportation Research Circular 212, Transportation Research Board, January 1980.

[2] Approximate ranges.

[3] Approximate ranges; at 50 seats per rail car.

At the present time, the MBTA Green Line branches through the Arlington and Copley Stations operate with two-unit trains during the PM peak hour period (approximately 4:00 PM to 6:00 PM). (NOTE: This operation is different than the single-unit trains which operated during PM peak hour periods along the Green Line during 1984). Although headways for each of the individual branch lines along the Green Line are currently scheduled for between 6 and 8 minute headways, the actual service headways typically vary during peak hour periods due to delays at upstream stations, breakdowns, and scheduling difficulties. Accordingly, to adequately assess existing system capacity, an evaluation of scheduled and actual headway operation is required.

Table 4.4 presents a summary of the PM peak hour scheduled operations at the Arlington Street Green Line Station. Capacity estimates are presented for the previously defined comfortable, peak and crush capacity levels. As previously indicated, these scheduled capacity levels may be misleading if actual operations vary from scheduled operations.

Based upon spring 1985 peak load counts taken by the MBTA at Arlington Station, actual operating capacities were next developed for the three capacity levels. These capacity levels are summarized in Table 4.5 for PM peak hour inbound and outbound directions. These capacities were calculated based upon the number of two car trains which actually arrived at Arlington Station (inbound and outbound) during the PM peak one-hour period. A comparison of Table 4.4 and 4.5 indicates that actual service typically varies from scheduled service during the peak hour period. Based upon the MBTA spring 1985 data, actual PM peak hour capacities for the various capacity levels range from 8,375 to 14,060 passengers per hour.

The next step in the analysis involved a comparison of the 1985 observed line capacities and 1985 observed passenger loads at Arlington Station. Average loads during the PM peak hour were then calculated and compared with the previously outlined level of service designations. The 1985 passenger counts and LOS designations are presented in Table 4.6. A review of this

TABLE 4.4: SCHEDULED SPRING 1985 PM PEAK HOUR SYSTEM CAPACITIES INBOUND AND OUTBOUND

Branch	Scheduled Number of Two-Unit Trains On System During PM Peak Period[1]	Headway	Number of Scheduled Units At Station Per Peak One Hour[2]	Comfortable Capacity[3]	Peak Capacity[4]	Crush Capacity[5]
'B' Boston College	13	7 min	17	2,125	2,550	3,230
'C' Cleveland Circle	12	7.5 min	16	2,000	2,400	3,040
'D' Riverside	15	7 min	17	2,125	2,550	3,230
'E' Arborway	14	6 min	20	2,500	3,000	3,800
				8,750	10,500	13,300

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[1] Represents the number of two-unit trains scheduled to service the particular branch during the 4:00 PM - 6:00 PM peak period: Source: MBTA Spring 1985 Line Statistics, obtained from CTPS.

[2] Assuming operation of two-unit trains at scheduled headways.

[3] Represents a comfortable system capacity. Derived using a capacity of 125 passengers per unit, from data presented in "Interim Materials on Highway Capacity," Transportation Research Board Circular 212, January 1980.

[4] Represents a peak system capacity. Derived using a capacity of 150 passengers per unit, from data presented in "Interim Materials on Highway Capacity," Transportation Research Board Circular 212, January 1980.

[5] Represents a crush, or maximum, system capacity. Derived using a capacity of 190 passengers per unit, from data presented in "Interim Materials on Highway Capacity," Transportation Research Board Circular 212, January 1980.

TABLE 4.5: 1985 ACTUAL PM PEAK HOUR SYSTEM CAPACITIES

Inbound

Branch	PM Peak Hour Counted Train Units[1]	Comfortable Capacity[2]	Capacity[3]	Crush Capacity[4]
'B' Boston College	14	1,750	2,100	2,660
'C' Cleveland Circle	14	1,750	2,100	2,660
'D' Riverside	17	2,125	2,550	3,230
'E' Arborway	22	2,750	3,300	4,180
TOTAL ACTUAL SYSTEM CAPACITIES		8,375	10,050	12,730

Outbound

Branch	PM Peak Hour Counted Train Units[1]	Comfortable Capacity[2]	Capacity[3]	Crush Capacity[4]
'B' Boston College	18	2,250	2,700	3,420
'C' Cleveland Circle	19	2,375	2,850	3,610
'D' Riverside	18	2,250	2,700	3,420
'E' Arborway	19	2,375	2,850	3,610
TOTAL ACTUAL SYSTEM CAPACITIES		8,375	11,100	14,060

[1] Represents the actual number of train units counted at Arlington Station during the PM peak one hour period; Source: MBTA Peak Load Counts for April 1985.

[2] Represents a comfortable system capacity. Derived using a capacity of 125 passengers per unit, from data presented in "Interim Materials on Highway Capacity," Transportation Research Circular 212, January 1980.

[3] Represents a peak system capacity. Derived using a capacity of 150 passengers per unit, from data presented in "Interim Materials on Highway Capacity," Transportation Research Board Circular 212, January 1980.

[4] Represents a crush, or maximum, system capacity. Derived using a capacity of 190 passengers per unit, from data presented in "Interim Materials on Highway Capacity," Transportation Research Circular 212, January 1980.

TABLE 4.6: 1985 MBTA GREEN LINE OPERATIONS AT ARLINGTON STATION

Inbound

Branch	Counted Number of Vehicles[1]	Counted Number of Riders[2]	Average Load	LOS[3]
'B' Boston College	14	2,200	157	F
'C' Cleveland Circle	14	1,805	129	E'
'D' Riverside	17	2,320	136	E'
'E' Arborway	22	2,120	96	D
TOTAL	67	8,475	126	E'

Outbound

Branch	Counted Number of Vehicles[1]	Counted Number of Riders[2]	Average Load	LOS[3]
'B' Boston College	18	2,369	132	E
'C' Cleveland Circle	19	2,410	127	E'
'D' Riverside	18	2,370	132	E'
'E' Arborway	19	1,542	81	D
TOTAL	74	8,691	117	E

[1] Source: MBTA Peak Load Counts for April 1985.
[2] Per Train Unit; Source: MBTA Peak Load Counts for April 1985.
[3] Level of Service as outlined in Table 4.3.

table indicates that although the system is currently operating below a crush capacity level, it is operating at what is considered to be a peak capacity level on the inbound direction and a comfortable capacity level in the outbound direction during the PM peak hour period. Table 4.7 presents level of service results using 1983/1984 passenger and vehicle counts, with similar conclusions.

The above analysis has indicated that existing PM peak hour operations on the Green Line are below a crush capacity condition, but still at a level that may be perceived by many as being at, or over a comfortable capacity condition. There are several alternative strategies which may be used to increase the operational capacities of the Green Line. In the short term these would include additional trains during peak hour periods and reduced headways. The potential application of this methodology to future development proposals in the Back Bay area will be further evaluated as part of the second phase of this study.

4.3 Pedestrian Circulation

Pedestrian counts were taken by HMM Associates during the weeks of July 2 and July 9, 1984 along the major pedestrian corridors serving the Hynes Auditorium, as part of the Hynes Auditorium EIR.* Pedestrian counts were taken from 8:00 AM. to 11:00 AM, and from 3:00 PM to 5:00 PM on July 2 and 3, and July 9 and 10, 1984. These time periods were selected to coincide with the major trip generation times associated with the Hynes Auditorium.

The counts taken during the week of July 2 represent a weekday condition where a major national convention (i.e., the Shriners Convention) was scheduled at the Hynes Auditorium. Although only a limited number of activities associated with the Shriners Convention were held at the Hynes Auditorium it

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* "Hynes Auditorium Draft Environmental Impact Report," HMM Associates, August 15, 1984.

TABLE 4.7: 1983/1984 MBTA GREEN LINE OPERATIONS AT ARLINGTON STATION

Inbound

Branch	Counted Number of Vehicles[1]	Counted Number of Riders[2]	Average Load	LOS[3]
'B' Boston College	15	2,120	141	E'
'C' Cleveland Circle	16	1,735	108	E
'D' Riverside	18	2,370	132	E'
'E' Arborway	30	2,660	89	D
TOTAL	79	8,885	112	E'

Outbound

Branch	Counted Number of Vehicles[1]	Counted Number of Riders[2]	Average Load	LOS[3]
'B' Boston College	14	2,120	151	F
'C' Cleveland Circle	19	2,420	127	E'
'D' Riverside	20	2,500	125	E
'E' Arborway	24	1,960	82	D
TOTAL	77	9,000	116	E

[1] Source: "500 Boylston Street Draft Environmental Impact Report," Skidmore, Owings & Merrill, et al, October 1984.

[2] Source of data: "500 Boylston Street Draft Environmental Impact Report," Skidmore, Owings & Merrill, et al October 1984.

[3] Level of Service range as outlined in Table 4.3.

was expected that these events would result in higher pedestrian flows in the study area than would typically occur during a "non-convention" weekday period. These pedestrian counts were used to assess the upper range of existing activity present in the immediate vicinity of the Hynes Auditorium, representing a condition when the Auditorium is attracting a significant number of persons. The AM and PM peak hour and peak 15-minute period pedestrian flows taken during the July 2 week, with the Shriners Convention are presented in Appendix 5. The highest peak hour pedestrian volumes during the July 2 week are along the Prudential Center West Court corridor. Peak hour non-directional pedestrian levels at key mid-block points along this route are similar for both the AM and the PM study periods, with the maximum hourly two-way flow approaching 1500 people. A major portion of this activity, both during morning and afternoon peak periods, is attributable to the Sheraton Hotel. Peak hour pedestrian flows at most study locations are higher during the PM period than for the AM peak. There is no predominant directional split during either the morning or afternoon peak periods along the study corridors. A large number and variety of attractions (i.e., businesses, shops, restaurants, etc.) throughout and immediately surrounding the area maintain pedestrian movement in all directions throughout the course of a day.

The peak 15-minute volumes at the study locations range from between 25 and 35 percent of the corresponding peak hour volume. Values within this range indicate that there was no significant peaking of pedestrian movement during the peak hour periods.

Additional pedestrian counts were taken during the week of July 9 for an indication of flows during a typical weekday period where no major activities were scheduled at the Hynes Auditorium. Peak one hour and 15-minute pedestrian flows for this week are also presented in Appendix 5 for AM and PM periods. Total pedestrian traffic along the Prudential Center West Court corridor was significantly lower for this week than for the preceding week, with the Shriners Convention. Total

flows were higher at the key locations during the PM peak hours than during morning peak periods. Maximum hourly flows range from approximately 650 people, during the AM period, to about 950 people during the corresponding PM period. Although directional pedestrian flows vary somewhat between the A.M. and the P.M. study periods, there is no particularly dominant flow (i.e., consistent movement in a given direction) during either time period. Also, the majority of peak 15-minute volumes range between 25 and 35 percent of the corresponding hourly volumes. Similar to the July 2 and 3 (Shriners Convention) study period, this range of percentages indicates that peak hour pedestrian flows were fairly evenly distributed throughout the entire A.M. and PM peak hour periods. Values within this range indicate that peak hour flows were at a constant rate for the entire hour rather than concentrated over a shorter time period. Therefore, the demand for pedestrian space remains at virtually the same level throughout the entire peak hour during both the morning and the evening study periods.

A comparison of peak 15-minute counts taken during the July 2 (the Shriners Convention) and July 9 ("non-convention") weeks are presented in Table 4.8. A review of Table 4.8 reveals that, for the most part, the peak 15-minute counts were higher during the week of July 2 for both the AM and the PM study periods. A comparison of the AM counts for each week shows that peak 15-minute pedestrian flows were higher at most study locations during the July 2nd week.

Levels of service were determined for each of 11 locations during a morning and afternoon peak period within each of the three areas of pedestrian activity adjacent to the Hynes Auditorium. These results indicate that the existing walkway capacities were adequate to accommodate pedestrian traffic during both observation periods. A summary of LOS values for the July 2 and 3, as well as the July 9 and 10 observation periods is contained in Table 4.9. Pedestrian flow rates at each of the 11 locations were found to correspond to LOS A for the both the July 2 and July 9 weeks.

TABLE 4.8

HYNES AUDITORIUM PEAK 15-MINUTE PEDESTRIAN VOLUMES[1]

	July 2 Week (Shriners' Convention)		July 9 Week (No Hynes Event)	
	AM	PM	AM	PM
Location*				
West Court				
1	155	131	147	164
2	260	433	148	262
3	419	421	186	141
4	289	224	174	179
West Escalators (Ring Rd.)				
5	174	261	153	229
6	105	166	79	172
7	112	188	89	182
8	68	94	68	94
Dalton St. (Ring Rd.)				
9	95	89	20	57
10	185	97	48	76
11	40	36	22	30

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[1] Source: "Hynes Auditorium Draft Environmental Impact Report," HMM Associates, August 15, 1984.
NOTE: Location numbers correspond with map reference numbers in Appendix 5.

TABLE 4.9

LEVELS OF SERVICE OF EXISTING PEDESTRIAN CORRIDORS ADJACENT TO THE HYNES AUDITORIUM[1]

Existing Conditions	Week of July 2		Week of July 9	
Location*	AM	PM	AM	PM
West Court				
1	A	A	A	A
2	A	A	A	A
3	A	A	A	A
4	A	A	A	A
West Escalators (Ring Road/Boylston Street)				
5	A	A	A	A
6	A	A	A	A
7	A	A	A	A
8	A	A	A	A
Dalton Street				
9	A	A	A	A
10	A	A	A	A
11	A	A	A	A

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[1] Source: "Hynes Auditorium Draft Environmental Impact Report," HMM Associates, August 15, 1984.

NOTE: Location numbers correspond with map reference numbers in Appendix 5.

In another study, pedestrian volumes on the St. James Avenue, Clarendon Street, Boylston Street and Berkeley Street block were monitored for AM and PM peak hours as well as the noon hour. A summary of the pedestrian level of service for these segments is presented in Table 4.10. This table indicates that for all sidewalk segments there will be sufficient area to enable pedestrians to freely select walking speed, to bypass slower pedestrians, and to avoid crossing conflicts with other pedestrians and vehicles.

Additional pedestrian counts were taken by the City of Boston Planning and Engineering Department. These are presented in Table 4.11. In general, pedestrian levels for the particular study area are much higher during the noon hour period and the late afternoon peak than in the morning.

4.4 External Influences

There are several "bottleneck" locations outside the designated study area which may adversely influence internal traffic operations. The extent of influence on study area roadways is determined by the varying daily severity of traffic back-ups at these bottleneck locations. A brief description of problems at these sites and the resultant effects on internal area vehicle movements is presented below.

TABLE 4.10
PEDESTRIAN LEVEL OF SERVICE

Street and Time	Effective Sidewalk Width (ft)	Direction	Existing Hourly Volume	Project Hourly Volume	Combined Average Pedestrian Flow Volume (PFM)	LOS[1]
Boylston St.	19					
AM		EB	195	1,380	2	A
		WB	204	380	2	A
Noon		EB	968	290	2	A
		WB	969	290	2	A
PM		EB	885	510	3	A
		WB	816	1,520	3	A
Clarendon St.	9					
AM		NB	255	730	3	A
		SB	212	460	3	A
Noon		NB	370	140	2	A
		SB	316	140	2	A
PM		NB	204	200	2	A
		SB	478	410	2	A
St. James Ave.	10					
AM		EB	67	180	1	A
		WB	126	180	1	A
Noon		EB	143	60	1	A
		WB	133	60	1	A
PM		EB	265	200	1	A
		WB	131	200	1	A
Berkeley St.	11					
AM		NB	179	370	1	A
		SB	133	180	1	A
Noon		NB	780	60	2	A
		SB	553	60	2	A
PM		NB	246	200	2	A
		SB	215	400	2	A

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[1] Pedestrian Planning and Design by J. J. Fruin: level of service (LOS) criteria based on sidewalk width and pedestrian flow.
Source: "500 Boylston Street Draft Environmental Impact Report," Skidmore, Owings & Merrill, et al., October 1984.

TABLE 4.11

PEDESTRIAN COUNTS TAKEN BY THE CITY OF BOSTON

		PEAK HOURS (1 HOUR VOLUME)	
Location	AM Peak	Noon	PM Peak
Arlington and Boylston Streets	8:30-9:30 (1137)	12:00-1:00 (1232)	4:30-5:30 (2026)
Arlington, Columbus and Stuart Streets	8:00-9:00 (809)	12:00-1:00 (1155)	4:00-5:00 (858)
St. Botolph and West Newton Street	8:00-9:00 (314)	12:00-1:00 (319)	3:30-4:30 (421)

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[1] Source: City of Boston Traffic and Parking Department Pedestrian Counts.

Leverett Circle

Diversions to study area roads occur during periods of queueing along Storrow Drive inbound from Leverett Circle. As a result, PM peak hour queues frequently extend from the Berkeley Street on-ramp to Beacon Street, and sometimes along that portion of Berkeley Street beyond the Beacon Street intersection. Therefore, in severe cases, this condition interferes with cross trips through the area on Beacon Street as well as with outbound trips toward Storrow Drive.

Also, diversions from the Leverett Circle congestion includes increased use of Clarendon Street for cross-city movements, as well as increased use of Arlington Street and illegal U-turns at the Beacon Street/Arlington Street intersection.

Herald Street

Heavy outbound flow along Herald Street to the Southeast Expressway can conflict with traffic travelling along Arlington Street. During periods of extremely heavy flow along Herald Street, queues may occur along Arlington Street within the study area, especially between Herald and Stuart Streets.

Tremont Street/Boylston Street Intersection

Signal-related queues along Boylston Street may extend to and block operations at the normally free-flowing Charles Street/Boylston Street intersection. When this condition occurs, Park Square traffic is likely to seek alternate routes.

Beacon Street North

As previously mentioned, one of the alternatives to the Leverett Circle congestion is over Beacon Hill via Charles Street. This diversion may create traffic back-ups within the

downtown area itself, most notably along Bowdoin and/or School Streets. This situation can result in the re-routing of traffic back along Beacon Street and toward other aforementioned problem areas (e.g., Beacon Street/Berkeley Street intersection, Storrow Drive on-ramp, etc.).

5. 1985 TO 1990 STATUS EVALUATION

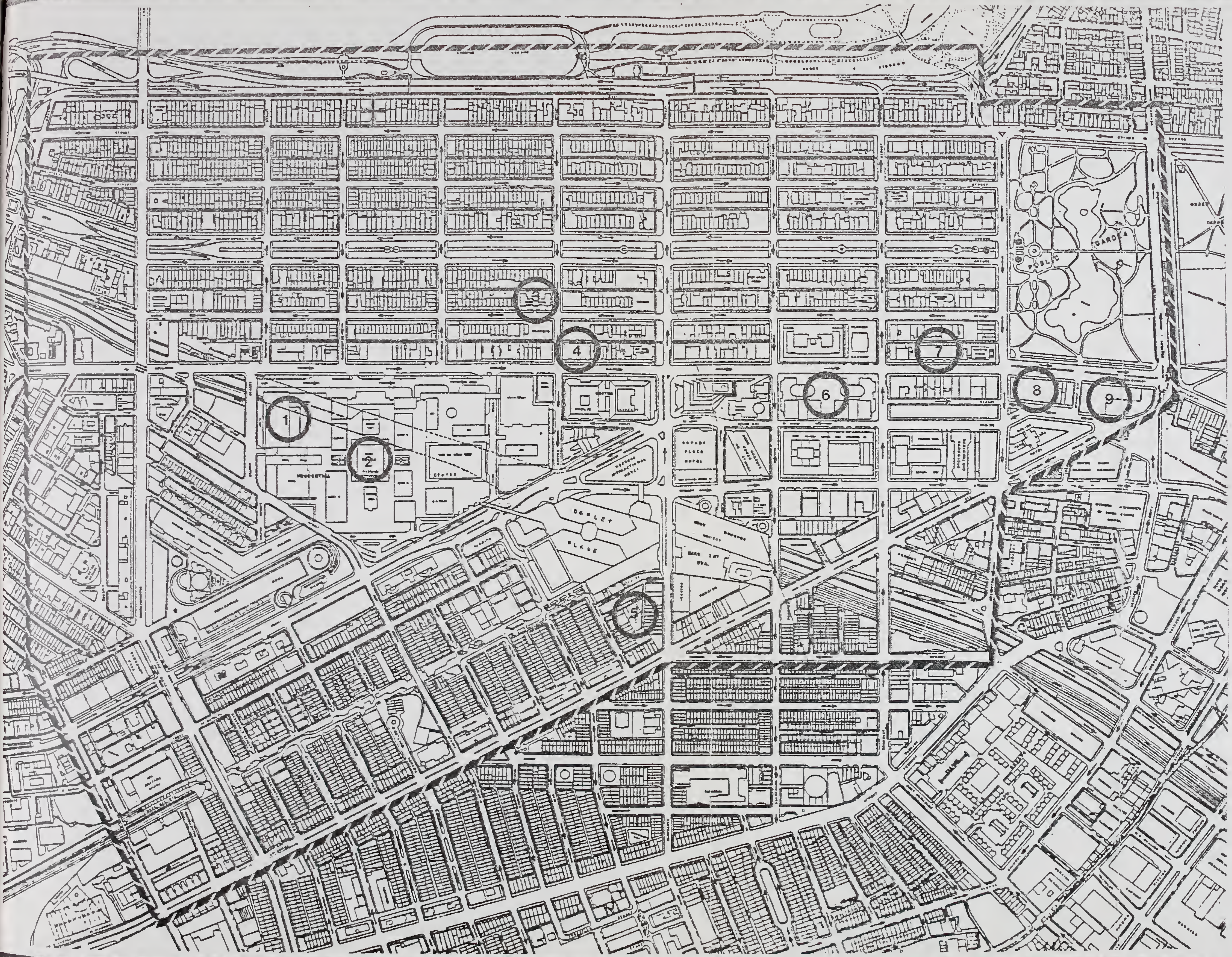
5.1 Development Proposals

There are numerous developments proposed in Back Bay. A major proposal which has recently undergone extensive analysis by City and State officials is the 500 Boylston Street building proposed by New England Life Insurance Company and Gerald D. Hines. Environmental Impact Reports for this project were prepared for the BRA and the EOEA. Transportation issues were of key importance in the analyses. Many nearby development proposals were included in the traffic study conducted for the 500 Boylston Street building.

Outlined below are the development proposals that can be expected to generate additional traffic in Back Bay. Included for each proposal is the location, size, use, estimated completion date, and references for any studies done on the project. Figure 5.1 shows the location of each project. Projects that were included in the 500 Boylston Street analysis are indicated by an asterisk(*).

1. Hynes Auditorium*

Location: 900 Boylston Street
Use: Convention Center
Size: 374,000 SF (increase)
Completion Date: Fall, 1987
Other: The Hynes Auditorium will be expanded from 326,000 to 700,000 SF. It will cater more to large national conventions rather than consumer and trade shows. For more information refer to the EIR submitted to the EOEA (#5046).



Locations of Proposed Developments

▨ Study Area Boundary

NOTE: Numbers correspond to list in Section 5.1

0 250 500
Approx Scale in Feet

FIG. 5.1

2. Prudential Center Redevelopment

Location: 900 Boylston Street
Use: Residential, Retail, Office, Parking
Size: Unknown
Completion Date: Conceptual Stage
Other: The Prudential Insurance Company is reportedly analyzing the possibility of redeveloping its property. Significant increases in retail and office space are projected. Detailed review by the City and State would be required for such a project.

3. Prince School*

Location: Newbury Street at Exeter Street
Use: Residential
Size: 35 Units
Completion Date: Unknown
Other: This project involves the renovation of a school building into residential units.

4. One Exeter Place*

Location: 675-91 Boylston Street
Use: Retail, Office
Size: 10,000 SF; 195,000 SF respectively
Completion Date: 1985
Other: This building is nearly complete.

5. Tent City

Location: Dartmouth Street at Southwest Corridor
Use: Residential, Parking (698 spaces)
Size: 270 Housing Units
Completion Date: 1989

6. 500 Boylston Street*

Location: 500 Boylston Street
Use: Retail, Office
Size: 100,000 SF; 1,200,000 SF respectively
Completion Date: 1989 (Phase I completion 1987)
Notes: This project will occupy the full block bounded by Boylston, Berkley, St. James and Clarendon Streets. It will be comprised of two 19-story towers on a 6-story base.

7. 399 Boylston Street*

Location: 399 Boylston Street
Use: Retail, Office
Size: 12,000 SF: 210,000 SF respectively
Completion Date: 1985
Other: This building is nearly complete.

8. Arlington/Hadassah Way*

Location: Block bounded by Arlington, Boylston, Hadassah, Providence Streets
Use: Residential, Retail, Office
Size: 100 units; 45,000 SF; 120,000 SF respectively
Completion Date: Unknown
Other: This project has been stalled due to problems assembling the site.

9. Four Seasons Hotel and Condominiums*

Location: Boylston Street at Park Square
Use: Hotel, Residential
Size: 290 rooms, 100 units respectively
Completion Date: 1985
Other: The Four Seasons project is a luxury development providing hotel rooms, as well as condominiums. Condo owners will be able to avail themselves of the amenities of the hotel.

5.2 Roadway Improvements

Numerous transportation improvements, either proposed or currently underway, have the potential to affect traffic in the Back Bay. Some of the major projects are reviewed below.

- Park Square Improvement Project

The project involves closing the sections of Providence Street and Columbus Avenue between Arlington Street and Park Square, diverting traffic on these streets (now both one-way westbound) to Charles, Boylston and Arlington Streets. Boylston Street is to be made two-way for this purpose between Arlington and Charles Streets, using the English "drive on the left" directional flow pattern. The intersections at Arlington/Boylston, Charles/Boylston, Charles South/Stuart, Stuart/Tremont and Stuart/Washington will receive new geometric and signal treatments, along with the intervening roadways.

- Central Artery Depression

This project involves the relocation of the Central Artery underground through Boston. This project has been proposed for many years and its design status or projected date of completion is unknown at this time.

o Third Harbor Tunnel

It has been obvious for many years that a new tunnel is needed, primarily to provide additional ground access to Logan Airport. Numerous alternatives have been analyzed. Like the Central Artery Depression project, it is difficult to predict when this project may be completed.

5.3 Mass Transportation Improvements

The major future mass transportation improvement within the study is the Orange Line Relocation Project. Service on the new Orange Line will be provided to the Back Bay Station on Dartmouth Street, and is expected to start in late 1986 or early 1987. When completed, this line will provide improved service from the Back Bay to the inner northeast and southwest suburbs. In addition, approximately 50 new LRV's have been ordered for the Green Line by the MBTA and are scheduled to be in operation by early 1986. Track improvements on the Green Line are also scheduled for 1986.

The South Station Transportation Center is a major rail, bus, subway intermodal station being developed at the existing South Station site. This major development will include a level devoted exclusively to bus operations, including direct access to the Massachusetts Turnpike and the Expressway.

6. DISCUSSION OF KEY TRANSPORTATION PROBLEMS

6.1 Traffic Volume Levels

Traffic volume levels along most Back Bay streets have increased in the past few years due, in part, to new development which has occurred in the area. In addition, the various developments which are either under construction or proposed in the area have a potential to add a significant amount of additional traffic within the Back Bay study area. Table 6.1 summarizes existing (1985) and future traffic volume levels along key roadway sections in the study area. A review of this table indicates that traffic volumes associated with future development may increase existing levels by 39% along portions of Berkeley Street, and by 24% along Clarendon Street during PM peak hour periods.

The BRA's goal of reducing traffic volume levels in the area can most effectively be addressed by increased mass transportation and HOV usage and improved transit operations. Many of the specific actions which may be taken to address improved mass transportation involve intermediate long-term strategies, which will be further evaluated in the final report. Several short term actions, however, may be taken to encourage mass transporation usage and are outline below.

Additional short term actions and strategies aimed at: (1) reducing traffic volume levels on Berkeley Steet, and (2) improving transporation operations in the Back Bay area are also outlined below.

6.2 Berkeley Street Corridor

Berkeley Street, through the Back Bay, serves several different functions: (1) as a local collector street for the area, (2) as a primary corridor for employees and shoppers coming to and from the area, and (3) as the major access corridor to Storrow Drive east and west and the Expressway

TRAFFIC VOLUME SUMMARY

Street	From	To	Existing[1]	1989 Volumes Without 500 Boylston Street[2]	1989 Volumes With 500 Boylston Street[3]	Net Contribution of 500 Boylston Street
Berkeley	St. James	Boylston	1,422	1,715	1,913	198
Berkeley	Boylston	Comm. Ave.	1,190	1,564	1,701	137
Berkeley	Comm. Ave.	Beacon	1,352	1,765	1,883	118
Beacon	Berkeley	Clarendon	1,164	1,219	1,229	10
Beacon	Clarendon	Dartmouth	906	941	951	10
Clarendon	St. James	Stuart	632	649	782	133
Clarendon	Stuart	Columbus	1,189	1,244	1,480	236
Clarendon	Columbus	Appleton	854	909	1,028	119
St. James	Berkeley	Clarendon	836	965	1,195	230

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[1] 1985 PM Peak Hour Volumes (4:30 PM to 5:30 PM) developed by HMM Associates.

[2] Incremental traffic volumes and distribution of trips for 1989 No-Build Conditions (future condition without 500 Boylston Street Development) presented in "500 Boylston Street Draft Environmental Impact Report", and based on 1985 PM peak hour volumes developed by HMM Associates.

[3] Includes incremental traffic volumes and distribution of trips for 1989 Build Condition (Future Condition with 500 Boylston Street Development) presented in "500 Boylston Street Draft Environmental Impact Report", and based on 1985 PM peak hour volumes developed by HMM Associates.

north. The multiple functions of this roadway corridor, in conjunction with recent area developments, have led to increased peak hour traffic volume levels and congestion along Berkeley Street.

Although the traffic signal coordination along Berkeley Street appears to be reasonably efficient during PM peak hour periods, vehicle progression is generally poor due in large part to double-parked vehicles and vehicular/pedestrian conflicts. Operations are currently approaching unstable flow conditions along sections of this corridor, particularly at the intersection of Berkeley Street and Beacon Street. The presence of double-parked vehicles frequently results in significant queueing and vehicle delays during PM peak hour periods along Berkeley Street, from Boylston Street all the way to Storrow Drive.

6.3 Critical Intersection Locations

As indicated in Section 4.1, there are currently several intersection locations within the Back Bay study area which are approaching unstable flow conditions. With the proposed development scheduled for the area within the next 4-5 years (including 500 Boylston Street), many of these intersections will be operating at unstable flow conditions or at capacity, without operational improvements.

Mitigative measures to improve operations at these key intersection locations have been reviewed, and are discussed in Section 7. It is worth noting, however, that although operational improvements at critical intersection locations may improve peak hour traffic flow, these improvements would not tend to reduce traffic volume levels in the area.

6.4 Vehicle/Pedestrian Conflicts

The existing office, retail, and residential uses in the Back Bay area generate a significant amount of pedestrian

traffic on a typical weekday. The major pedestrian corridors are along Boylston Street, and portions of St. James Avenue, Stuart Street, Berkeley Street, and Clarendon Street.

Although, pushbutton actuation is available at all signalized locations within the study area, pedestrian crossings often occur during pedestrian "don't walk" phases. This results in impediments to smooth vehicular traffic and presents potential safety hazards. In addition, right turn on red (RTOR) movements often result in vehicular/pedestrian conflicts which impact the potential effectiveness of this movement.

Based upon visual observations and pedestrian counts which have been taken during PM peak hour periods, the following locations present the most significant occurrence of vehicular/pedestrian conflicts:

- Boylston Street at Berkeley Street;
- Boylston Street at Dartmouth Street;
- Dartmouth Street at Stuart Street; and
- Boylston Street at Clarendon Street.

6.5 Increased Traffic Along St. Botolph Street, East of Massachusetts Avenue

Traffic volume levels have increased along St. Botolph Street in the recent past due, in part, to the fact that left turns from Massachusetts Avenue southbound to Huntington Avenue are prohibited. Persons desiring to travel along Huntington Avenue eastbound now turn left onto St. Botolph Street. In May of 1985, the City Traffic and Parking Department reviewed the operations at the Massachusetts Avenue/Huntington Avenue and Massachusetts Avenue/St. Botolph Street intersection and concluded that there was sufficient pavement width along the Massachusetts Avenue southbound approach at Huntington Avenue to incorporate a left turn lane. Incorporation of this left turn lane is recommended for further design studies.

6.6 Parking

At the present time, it is estimated that on-street parking in the area is at capacity, while off-street parking in lots and garages is under capacity by noon during most weekdays.* In reality, on-street parking is over capacity, since there is typically a significant amount of double-parking occurring within the Back Bay area. Most studies conducted within the Back Bay and the City of Boston in general indicate parking shortfalls by the year 1990.

Double-parked vehicles are a particular problem in relation to traffic flow during PM peak hour periods along (1) Beacon Street, between Arlington Street and Clarendon Street, (2) Arlington Street, between Beacon Street and Stuart Street, (3) Berkeley Street, between Boylston Street and Beacon Street, and (4) Newbury Street, between Clarendon Street and Massachusetts Avenue.

Previous studies* have indicated a specific shortage of short-term parking spaces within the City of Boston. Such a short-term parking shortage in the Back Bay area is apparent, and is the likely cause for much of the illegal double-parking occurring in the area.

6.7 Service and Goods Deliveries

Delivery vehicles, which are frequently angled or double-parked do have an impact on existing peak hour operations in the area, particularly along Newbury Street, from Clarendon Street to Massachusetts Avenue, and Boylston Street from Fairfield Street to Arlington Street. Presently retail establishments are able to purchase from the City "loading zone" spaces which are intended to be used for both deliveries

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* Source: "Parking in Central Boston: Meeting the Access Needs of a Growing Downtown," Cambridge Systematics, Inc., with Vanasse/Hangen Associates, December 1983.

and short-term parking. These loading zone spaces are generally located in front of the particular retail establishment, as identified by the retail owner. The City of Boston currently does not designate the loading zone locations.

Observations along these streets indicate that: (1) many of the designated loading zones are being used for long-term parking, and (2) most delivery vehicles double-park when servicing the area.

6.8 External Influences

As indicated in Section 4.4, there are several roadway corridors and intersection bottleneck locations outside of the designated study area which currently impact traffic operations in the Back Bay neighborhood. These include Storrow Drive, Leverett Circle, Herald Street toward the Southeast Expressway, the Southeast Expressway and Central Artery, Kneeland Street, and the intersection of Boylston Street and Tremont Street. Operations at these locations, particularly during peak hour periods do and will have an effect on traffic flow through the Back Bay.

6.9 Green Line Service

Presently, the MBTA Green Line has problems with service, reliability, and overcrowded conditions. Frequent breakdowns occur due, in part, to the poor track conditions. Although Green Line ridership is significantly lower than a decade ago, the number of users has increased in the past few years.

The existing system utilizes scheduling checks only at the beginning of the individual runs. The system is not designed to allow time to be "made up" for delays at individual locations. Accordingly. delays are compounded and based upon observations, scheduled headways are seldom met during peak hour periods.

7. SHORT-RANGE TRANSPORTATION STRATEGIES

7.1 Outline of Alternatives Evaluated

As part of this initial report, several alternatives were identified to (1) reduce traffic volume levels along Berkeley Street, and (2) to mitigate identified transportation problems. Although primary emphasis for the first phase of this study has been placed on short-term solutions, preliminary intermediate and long-range alternatives were also reviewed.

During the initial stages of this study, the street system was reviewed in terms of the existing direction of traffic flow patterns. Alternatives which were discussed at the first Working Committee meeting on May 16, 1985, were (1) reversal of existing one-way traffic flows along selected streets, and (2) changing Boylston Street to two-way flow from Charles Street to Massachusetts Avenue. Following preliminary assessment of these strategies, it was concluded that they did not warrant detailed evaluation, due to potential significant adverse impacts.

Reversing the flow along selected streets in the Back Bay area would affect the existing grid system of alternating traffic flows. In addition, such an alternative would not address any identified problems associated with the existing traffic flow patterns. Reversals of selected one-way streets would be costly to implement and may result in short term safety problems with drivers not familiar with the altered directional flow.

Likewise, there are significant implications of changing Boylston Street to a two-way system, paramount of which are: (1) increased pedestrian/vehicular conflicts at most Boylston Street intersections, and (2) degraded operating conditions at Boylston Street intersections, particularly during peak hour periods. The Boylston Street two-way traffic flow proposal was discussed at the Back Bay Working Committee meetings. The proposal would significantly impact operations along Boylston Street, increasing both vehicular and pedestrian conflicts. The existing signal system for Boylston Street would have to be updated with additional signal hardware and timing plans. The proposal may, in

fact, act to encourage more through traffic to Back Bay, further increasing traffic volume levels in the area.

Additional alternatives which were evaluated in more detail are discussed below.

7.2 Measures to Reduce Traffic Volume Levels Along Berkeley Street

7.2.1 Close Storrow Drive East and West Access Ramps at Berkeley Street

The most dramatic measure which can be taken to reduce traffic volume levels along Berkeley Street would be to close off the Storrow Drive east and west access at Berkeley Street. In order to assess the potential impacts and likely diversions associated with this alternative, existing traffic flows and turning movements during the PM peak hour were reviewed.

The general diversions expected from closing off the Storrow Drive east and west access at Berkeley Street are illustrated in Appendix 6. This diversion pattern was used to reassign existing PM peak hour traffic flows and re-assess peak hour operations at key intersection locations. (Note: Although this procedure provides a basis for likely diversions, it is recommended that a detailed license plate origin-destination study be conducted to provide more detailed data for a further assessment of this alternative.) The impact of this alternative is summarized below:

Location	1985 Existing PM Peak Hour		Action: Close Off Storrow Drive East and West Access at Berkeley Street	
	LOS	V/C	LOS	V/C
1. Boylston St. & Charles St.	A	.44	A	.57
2. Charles St. & Beacon St.	D	.87	E	.97
3. Arlington St. & Beacon St.	D	.83	F	1.03
4. Beacon St. & Berkeley St.	D	.83	B	.63
5. Berkeley St. & Boylston St.	B	.68	C	.79
6. Boylston St. & Arlington St.	C	.75	D	.88

Closing off both the east and west access to Storrow Drive would have a significant impact on operations along Boylston Street, between Arlington Street and Charles Street; along Charles Street, between Boylston Street and Beacon Street; and along Beacon Street between Charles Street and Arlington Street. PM peak hour operations would be at LOS E (capacity) at the intersection of Charles Street and Beacon Street, and at LOS F (forced flow) at the intersection of Arlington Street and Beacon Street. In addition, traffic flow reductions would only be significant along certain sections of Berkeley Street.

7.2.2 Close Storrow Drive West Access Only at Berkeley Street

This alternative strategy would involve closing only the Storrow Drive westbound access from Berkeley Street. The traffic diversions expected from this alternative are also illustrated in Appendix 6. The PM peak hour operations associated with this strategy are summarized below:

Location	1985 Existing PM Peak Hour		Action: Close Off Storrow Drive West Access Only at Berkley Street	
	LOS	V/C	LOS	V/C
1. Boylston St. & Charles St.	A	.44	A	.44
2. Charles St. & Beacon St.	D	.87	D	.87
3. Arlington St. & Beacon St.	D	.83	D	.83
4. Beacon St. & Berkeley St.	D	.83	D	.81
5. Berkeley St. & Boylston St.	B	.68	B	.65
6. Boylston St. & Arlington St.	C	.75	C	.77

The impact of this second strategy would not impact operations east of Berkeley Street. In fact, operations would be improved at the intersection of Berkeley Street and Beacon Street. Traffic volumes, however, would increase along Beacon Street and Commonwealth Avenue, west of Berkeley Street, and volume reductions on Berkeley Street would only be significant along certain sections of the roadway.

7.2.3 Prohibit Left Turns Onto Berkeley Street from Boylston Street and Stuart Street

An alternative strategy which was evaluated to reduce traffic volume levels along Berkeley Street involves prohibiting left turns onto Berkeley Street from Boylston Street and Stuart Street. The traffic diversions which would result from this action are illustrated in Appendix 6. The PM peak hour impacts of this action at key locations within the study area are summarized below:

	Location	1985 Existing PM Peak Hour		Action: Prohibit Left Turns onto Berkeley Street from Boylston Street and Stuart Street	
		LOS	V/C	LOS	V/C
1.	Boylston St. & Charles St.	A	.44	A	.47
2.	Charles St. & Beacon St.	D	.87	D	.87
3.	Arlington St. & Beacon St.	D	.83	E	.93
4.	Beacon St. & Berkeley St.	D	.83	D	.82
5.	Berkeley St. & Boylston St.	B	.68	A	.59
6.	Boylston St. & Arlington St.	C	.75	D	.80

This alternative strategy would negatively impact PM peak hour operations at the intersections of Boylston Street at Charles Street, Charles Street at Beacon Street, and Beacon Street at Arlington Street. Service levels would remain the same (i.e., LOS D) at the Beacon Street/Berkeley Street intersection, while operations at the intersection of Berkeley Street with Boylston Street would improve from LOS B (V/C = .68) to LOS A (V/C = .59).

7.2.4 Reduce Green Time Allocations to Berkeley Street Approaches at Signalized Intersections

The reduction of green time to the Berkeley Street approaches at signalized intersections along Berkeley Street may tend to reduce traffic volume levels along the Berkeley Street corridor. The increased delays and congestion resulting

from this action would tend to encourage some drivers to search for alternative routes. Also, the delays would add to the CO emissions in the area.

This option is not considered to be a viable alternative since, although traffic volume levels along Berkeley Street might be reduced, peak hour traffic operations would not be improved, and, in fact, vehicle delays along Berkeley Street may be increased.

7.2.5 Priority Green Time for Berkeley Street Right Turns at Boylston Street

By giving additional green time for the Berkeley Street right turn onto Boylston Street, vehicles may be encouraged to travel along the Boylston Street-to Charles Street-to Beacon Street loop for access to Storrow Drive (i.e., rather than along the congested Berkeley Street corridor). This option would only be expected to slightly reduce traffic volume levels along Berkeley Street, since drivers taking advantage of this priority green time would experience similar delays along Charles Street and Beacon Street.

7.2.6 Area-Wide Vehicle Demand Reduction Strategies

There are a number of strategies and actions which can be taken to reduce traffic demand in the area. These include the following:

- o Mass transportation incentives, through reduced MBTA fees, or employee subsidies.
- o Preferential parking for high occupancy vehicles (HOV's) - vehicles with two or more passengers would park in designated spaces reserved for HOV's.
- o Parking price increases for long-term parking.

- Improved Green Line service (i.e., scheduled track improvements and the 50 new LRV's scheduled to be on-line in early 1986).

Details on these actions are summarized in Section 7.3.3. The increased use of mass transportation and high occupancy vehicles is the most promising strategy for accomplishing the BRA goal of reducing traffic volume levels in the area by 1987.

7.3 Measures to Mitigate Identified Transportation Problems

7.3.1 Geometric and Operational Improvements

The following outlines specific actions which may be taken in the short term to improve traffic operations or address traffic problems within the Back Bay study area.

- Charles Street/Beacon Street Intersection:

  Peak hour operations at the intersection could be improved by: (1) eliminating parking on the Beacon Street westbound approach, permitting two lanes of through-movements, and (2) prohibiting the left turn movement from Charles Street southbound.

- Beacon Street/Arlington Street Intersection:

  The right turn lane from Beacon Street to Embankment Road (Storrow Drive access) should be extended and the parking restriction along this right turn lane should be strictly enforced. This measure would permit the free right turn onto Storrow Drive which is currently blocked by parked vehicles during most PM peak hour periods.

- Arlington Street/Stuart Street/Columbus Avenue:

  Elimination of peak hour parking along the Arlington Street southbound approach at the Arlington Street/Stuart Street/Columbus Avenue intersection would provide an additional through lane for southbound travel. Additional restrictions on the south side of Stuart Street, to the east and west of Arlington Street, would provide an additional through-lane which would also be used by vehicles turning right onto Columbus Avenue.

- Berkeley Street/Beacon Street:

  Operations at the Berkeley Street/Beacon Street intersection could be improved by eliminating parking along the north side of Beacon Street within approximately 200' (10 spaces) of the intersection. This would provide an exclusive right turn lane for vehicles desiring to access Storrow Drive. Although there is currently a peak hour parking restriction along the west side of Berkeley Street at the intersection, it is not enforced, and parked vehicles block this lane during most PM peak hour periods. The pavement markings along Berkeley Street, north of Beacon Street should also be improved to clearly define two lanes, one for access to Storrow Drive east and the other for Storrow Drive west. Berkeley Street north of Beacon Street should also be re-paved, and consideration should be given to widening this section to 21 feet (from the existing 19-1/2' roadway).

- Boylston Street/Berkeley Street Intersection:

  Consideration should be given to incorporating an automatic exclusive pedestrian cycle at the

intersection of Boylston Street and Berkeley Street. In addition, the elimination of right turn on red should be considered. These improvements would significantly reduce vehicular/pedestrian conflicts in this area. However, traffic operations may be impeded by the resultant reduction in vehicular green time. At the present time, delays to vehicles travelling along Boylston Street are not significant. Therefore, if green time were taken from the Boylston Street approach and given to a pedestrian phase, flows along Berkeley Street would not be significantly impacted.

7.3.2 Parking Strategies

In the short term, the most effective measure to improve the parking problem in the Back Bay area is through better management of existing facilities. The most recent data available indicates that there is a surplus of off-street parking in the Back Bay area, on the order of approximately 500 spaces at noon on a typical day*. Most parking in off-street facilities is for long term parking. On-street parking, however, is currently used to capacity. In fact, on-street parking is actually over capacity if you consider the extent of double-parking which currently occurs throughout the course of the day.

Proposed actions and strategies to improve the current parking problem are outlined below:

- Preferential parking for high occupancy vehicles (HOV's): The City should establish a percentage of total off-street parking spaces which would have to

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* References: (1) "Parking in Central Boston: Meeting the Access Needs of a Growing Downtown", Cambridge Systematics, Inc. with Vanasse/Hangen Associates, and (2) "500 Boylston Street Draft Environmental Impact Report", Skidmore, Owings & Merrill, et. al., October 1984.

be designated for HOV's. Only vehicles with two or more passengers would be permitted to park in these designated spaces.

- Increase supply of short-term parking: Current observations indicate that many on-street parkers are long-term parkers (i.e., vehicles remain parked throughout the course of the day). With an existing excess of off-street parking, the City should encourage long-term parkers to use these off-street facilities where there is currently an excess supply. This option would require increasing designated on-street, short-term parking spaces, and strict enforcement.

- Increased enforcement: The present parking enforcement levels are not successful in the Back Bay area. Increased police enforcement would reduce the extent of double-parking and other parking violations. The City should evaluate its current parking enforcement levels and revise or increase the existing levels to ensure more effective enforcement.

7.3.3 Mass Transportation Alternatives

It is apparent that in order to reduce traffic volume levels in the area by 1987, there will have to be a shift from private automobile to mass transportation or use of HOV's. In the short term, several actions are available to work toward this goal, as outlined below:

- Improved Green Line Service: Approximately 50 new LRV's have been ordered by the MBTA for the Green Line Service. These new trains are scheduled to be delivered in the fall of 1985 and should be on-line

by early 1986. In addition, track repair operations on sections of the Green Line are scheduled during the next year. These line and fleet improvements should improve the reliability of the system. These improvements alone, however, would not be significant enough to drastically effect current Green Line ridership. The City should pursue, with the MBTA, alternative improvements focusing on track conditions and scheduling.

- Orange Line Relocation Project: As previously indicated, the Orange Line relocation project will include new service to the Back Bay Station, and offers a real opportunity to improve mass transportation to the Study Area. The project is scheduled for completion in late 1986 and will offer new direct service to many areas which are not currently serviced by mass transportation.

- Provision of partial or full subsidies for MBTA passes: Mass transportation subsidies could provide an incentive which would increase mass transportation usage and reduce total vehicle demand to the area.

- Increase of use of vanpooling/carpooling programs: This alternative would also have the effect of reducing total vehicle demand in the area.

- Increased parking fees for long-term parkers: Increasing the parking fees for long-term parkers would also provide an incentive for use of mass transportation.

- Encourage flexible work schedules: This alternative strategy would not necessarily reduce total vehicle

demands, although the peak hour would be spread out, thus mitigating peak one hour impacts.

- Newbury Street/Boylston Street Shuttle: The provision of a bus or van shuttle from one or more of the area garages to Newbury Street and Boylston Street could significantly reduce the extent of double-parking and circuitous travel which currently exist during both weekday and Saturday periods.

7.3.4 Pedestrian Circulation

Pedestrian/vehicle conflicts are significant at several locations within the study area. Incorporation of automatic, exclusive pedestrian phases into existing signal cycles and elimination of RTOR movements would reduce the number of conflicts and would result in less interrupted pedestrian movements. The key locations where these actions should be considered are at the following intersections:

- Boylston Street/Berkeley Street;
- Boylston Street/Clarendon Street;
- Boylston Street/Dartmouth Street.

It should be noted, however, that although these improvements would decrease pedestrian/vehicle conflicts and improve pedestrian flow, vehicular traffic flow would realize increased delays.

8. INTERMEDIATE AND LONG RANGE TRANSPORTATION ACTIONS AND STRATEGIES

As previously indicated, the primary focus of this initial study has been on short-term transportation actions and strategies. However, several intermediate and long-term options and alternatives were identified and are outlined below. These alternatives and others will be evaluated further during the second phase of this study.

Intermediate and long-range measures to reduce traffic volume levels in the Back Bay should focus on: (1) further incentives for mass transportation use, (2) encouragement of car/van pooling programs for all new development occurring in the area, and (3) improvements to the MBTA Green Line.

In addition, the possible relocation or addition of Storrow Drive access from Berkeley Street to Dartmouth Street or Massachusetts Avenue should be evaluated.

Access to the Central Artery and Southeast Expressway is currently poor. Alternatives which have been identified to improve this access include: (1) improved Boylston Street/Essex Street Corridor, (2) Herald Street improvement, and (3) eastbound access from the Back Bay to the Massachusetts Turnpike.

9. SUMMARY

9.1 Proposed Immediate Short Range Transportation Actions

Based upon the analyses conducted as part of this initial report, the following short range transportation actions are proposed. It should be noted that these recommendations are preliminary and will be supplemented and updated based upon further analyses conducted during the second phase of this study. These improvements will help relieve some of the congestion that occurs in the area today.

A. Improve parking restriction enforcement in the Back Bay area. The City should evaluate the existing enforcement coverage and frequency in the Back Bay area. Specific short-term options to address this issue are available, and specific City committments will be outlined in the final report.

B. Install signs indicating access to the Massachusetts Turnpike. Directional signs should be installed along portions of Arlington Street, Boylston Street, St. James Avenue, Clarendon Street, Berkeley Street, Beacon Street and Commonwealth Avenue, to direct drivers to the two Massachusetts Turnpike entrances on Dartmouth Street and Arlington Street.

C. The City should evaluate its current policy of permitting random loading zone spaces. The consolidation of loading zones should be evaluated on an area-wide basis.

D. Extend the right turn lane along Beacon Street at Arlington Street to accommodate right turning vehicles. This measure would permit the free right

turn onto Storrow Drive which, at the present time, is frequently blocked. The right turn lane should be extended along the Beaver Street to Brimmer Street block, and would result in the loss of approximately 8 existing spaces. This section of Beacon Street could be designated for resident parking after 6:00 PM. In addition, parking restrictions in the area should be strictly enforced during peak hour periods.

E. Restrict parking along Beacon Street at Berkeley Street to provide an exclusive right turn lane onto Storrow Drive. The right turn lane along Beacon Street should be extended for approximately 200 feet, which would result in a loss of 10 spaces. It is recommended, however, that this area be used for resident parking after 6:00 PM. In addition, although there is currently a PM peak hour parking restriction along the west side of Berkeley Street this lane is currently blocked by parked vehicles during most PM peak periods.

F. Relocate the existing cab stand along the south side of Stuart Street at the Arlington Street/Stuart Street/Columbus Avenue intersection. In addition, the existing peak hour parking restrictions along Arlington Street should be strictly enforced. Illegal parking along Arlington Street during the peak hour periods significantly reduces the capacity of this approach at the intersection.

G. Consideration should be given to installing an automatic exclusive pedestrian phase at the intersection of Berkeley Street and Boylston Street. Right turn on red should also be prohibited at this location.

H. Employee subsidies for MBTA passes (bus or rail) should be offered as an incentive to encourage mass transit usage. The City should investigate policy options to accomplish this action.

I. The City should take measures to improve parking management in the Back Bay. Short-term parking spaces should be increased and off-street facilities shold designate a certain percentage of total spaces for HOV use only.

J. There are several on-going improvements which will act to improve transportation operations in the area. These include: (1) the 50 new LRVs scheduled to be on-line for the Green Line in early 1986; (2) the Orange Line relocation and new service to Back Bay Station, scheduled to be open in late 1986; and (3) roadway improvements along Boylston Street and New Charles Street as part of the on-going Park Plaza improvements.

K. Design studies should be initiated by the City to evaluate the proposed addition of a left turn lane at the Massachusetts Avenue/Huntington Avenue intersection, along the Massachusetts Avenue southbound approach. This improvement would reduce the left turns currently being made onto St. Botolph Street.

10. FUTURE ANALYSIS CONSIDERATIONS

As part of the second phase of this study, a more detailed evaluation will be conducted for some of the transportation actions and strategies presented herein, particularly for the intermediate and long range options. It is recommended that existing PM peak hour counts be taken at between 4 and 5 additional locations to further update and verify the 1985 base traffic flow condition. In addition, a detailed origin-destination survey (license plate match) is proposed, to be conducted along Berkeley Street from Columbus Avenue to Beacon Street. This survey would document existing peak hour user characteristics along Berkeley Street and provide information needed for a more detailed evaluation of the potential diversion associated with closing of the Storrow Drive access (east and/or west) at Berkeley Street.

As previously indicated, the Central Transportation Planning Staff (CTPS) in conjunction with the MBTA, are presently conducting a detailed capacity analysis of the entire Green Line System - north and west. This effort will include an extensive count program, indicating boarding and alighting movements at individual stations. The CTPS/MBTA study is expected to be completed by early next year.

APPENDIX 1

BACK BAY NEIGHBORHOOD TRAFFIC STUDY WORKING COMMITTEE

Boston
Raymond L. Flynn, Mayor

Working Committee

Neighborhood Assoc. of the Back Bay (NABB)	Susan Prindle
N. E. Life – Civic Advisory Committee (CAC)	Jon Rotenberg 536-7300
Back Bay Association (BBA)	Marianne Abrams 266-1991
Fenway Civic Association (FCA)	Edward Burke 232-9500 x3616
Ellis Neighborhood Association (ENA)	Ken Gritter 542-5891
St. Botolph Citizen's Comm. (SBCC)	Elizabeth Smith 536-3071
Boston Redevelopment Authority (BRA)	Mitch Fishman 722-4300
Boston Traffic & Parking Dept. (BT&PD)	Phil Caruso 725-3084
HMM Associates	Bob Klimm
Staff (BT&PD)	Ted Siegel 725-3070 Joe Beggan 725-3086 Edwina Cloherty 725-3082

Lisa G. Chapnick, Commissioner, Traffic and Parking
City of Boston/City Hall Square/Boston, MA 02201

APPENDIX 2

TRAFFIC CONTROL INVENTORY

EXISTING CONDITIONS

The information in this appendix consists of the listings of following items:

- Signalized intersections
- Stop signs
- Snow emergency arteries
- Resident permit parking zones
- Tow zones
- Construction zones

SIGNALIZED INTERSECTIONS

Beacon Street and

- Charles Street
- Arlington Street
- Embankment Street
- Berkeley Street
- Clarendon Street
- Dartmouth Street
- Exeter Street
- Fairfield Street
- Gloucester Street
- Hereford Street
- Massachusetts Avenue

Marlborough Street and

- Berkeley Street
- Clarendon Street
- Dartmouth Street
- Gloucester Street
- Massachusetts Avenue

Commonwealth Avenue and

- Arlington Street
- Berkeley Street
- Clarendon Street
- Dartmouth Street
- Exeter Street
- Fairfield Street
- Gloucester Street
- Hereford Street
- Massachusetts Avenue

Newbury Street and

- Berkeley Street
- Clarendon Street
- Dartmouth Street
- Exeter Street
- Massachusetts Avenue

Boylston Street and

- Charles Street
- Arlington Street
- Berkeley Street
- Clarendon Street
- Dartmouth Street
- Exeter Street
- Fairfield Street
- Gloucester Street
- Hereford/Dalton Streets
- Massachusetts Avenue

St. James Avenue and

- Arlington Street
- Berkeley Street
- Clarendon Street
- Dartmouth Street/Huntington Avenue

Stuart Street and

- Arlington Street/Columbus Avenue
- Berkeley Street
- Clarendon Street
- Dartmouth Street

Huntington Avenue and

- Exeter Street/Stuart Street
- Ring Road
- Belvidere Street/West Newton Street
- Cumberland Street
- Massachusetts Avenue

Columbus Avenue and

- Stuart Street/Arlington Street
- Berkeley Street
- Dartmouth Street
- Appleton Street/West Canton Street
- West Newton Street
- Massachusetts Avenue

Massachusetts Avenue and

- Belvidere Street

STOP SIGNS

Stop signs are located at the following intersections:

Marlborough Street and

- Exeter Street (on Exeter)
- Fairfield Street (on Fairfield)
- Hereford Street (on Marlborough)

Newbury Street and

- Fairfield Street (on Fairfield)
- Gloucester Street (on both)
- Hereford Street (on both)

Columbus Avenue and

- Clarendon Street (on Clarendon)
- Holyoke Street (on Holyoke)
- Braddock Park (on Braddock Park)

Chandler Street and

- Columbus Avenue (on Chandler)
- Clarendon Street (on Chandler)

Appleton Street and

- Dartmouth Street (on Appleton)
- Clarendon Street (on Appleton)
- Berkeley Street (on Appleton)

St. Botolph Street and

- West Newton Street (4-way stop)
- Cumberland Street (on Cumberland)

Massachusetts Avenue and
- Clearway Street (on Clearway)
- St. Germain Street (on St. Germain)

SNOW EMERGENCY ARTERIES

Snow emergency artery information signs are located along the following street segments:

Beacon Street between

Beaver and Massachusetts Avenue

Commonwealth Avenue between

Arlington and Massachusetts Avenue

Boylston Street between

Hereford and Gloucester
Gloucester and Fairfield (on the north side only)
Exeter and Dartmouth (on the south side only)
Dartmouth and Clarendon (on the north side only)
Clarendon and Berkeley (on the south side only)
Berkeley and Arlington

Stuart Street between

Arlington and Clarendon (on the south side only)
Trinity Place and Dartmouth (on the north side only)

Columbus Avenue between

Arlington and Berkeley (on the north side only)
Berkeley and Clarendon
Wellington and Massachusetts Avenue

Arlington Street between

Beacon and Marlborough (on the east side only)
Commonwealth and Newbury (on the east side only)
Melrose and Marginal (on the east side only)

Berkeley Street between

Beacon and Marlborough
Marlborough and Commonwealth (on the east side only)
Commonwealth and Newbury (on the west side only)
Newbury and Boylston (on the east side only)
St. James and Columbus (on the west side only)
Chandler and Appleton (on the west side only)

Clarendon Street between

Beacon and Marlborough
Commonwealth and Newbury
Newbury and Boylston (on the west side only)

Dartmouth Street between

Beacon and Boylston
Boylston and Huntington (on the west side only)

Massachusetts Avenue between

Beacon and Marlborough (on the west side only)
Marlborough and Newbury (on the east side only)
Boylston and St. Botolph
St. Botolph and Columbus (on the west side only)

RESIDENT PERMIT PARKING ZONES

Resident Permit parking information signs are located along the following street segments:

Beacon Street between

- Charles and Beaver (on the north side only)
- Berkeley and Clarendon (on the south side only)
- Clarendon and Massachusetts Avenue

Marlborough Street between

- Arlington and Massachusetts Avenue

Commonwealth Avenue between

- Arlington and Berkeley (on the south side only)
- Berkeley and Gloucester
- Gloucester and Hereford (on the south side only)
- Hereford and Massachusetts Avenue

Newbury Street between

- Gloucester and Hereford (on the north side only)

Clarendon Street between

- Chandler and Appleton

Exeter Street between

Commonwealth and Newbury

Fairfield Street between

Commonwealth and Newbury

Gloucester Street between

Commonwealth and Newbury

Hereford Street between

Commonwealth and Newbury (on the east side only)

St. Botolph Street between

Massachusetts Avenue and West Newton

West Newton Street between

St. Botolph and Columbus (on the east side only)

Chandler Street between

Columbus and Berkeley

Appleton Street between

Columbus and Berkeley

TOW ZONES

Tow zone information signs are located along the following street segments:

Buses Only

Newbury Street between

Gloucester and Fairfield (north side)
Exeter and Dartmouth (north side)
Clarendon and Berkeley (north side)

Boylston Street between

Dalton and Fairfield (south side)
Clarendon and Berkeley (south side)
Arlington and Charles (south side)

St. James Avenue between

Dartmouth and Clarendon (north side)
Clarendon and Berkeley (north side)
Berkeley and Arlington (north side)

Stuart Street between

Dartmouth and Clarendon (south side)
Clarendon and Berkeley (south side)
Arlington and Charles (south side)

Huntington Avenue between

Belvidere and Ring (north side)
Ring and Exeter (north side)

Columbus Avenue between

Holyoke and West Canton (north side)
Berkeley and Arlington (south side)

Massachusetts Avenue between

- Marlborough and Commonwealth (east side)
- Commonwealth divide (both sides)
- Newbury and Boylston (both sides)
- St. Germain and Clearway (west side)
- Clearway and Westland (both sides)
- Westland and Huntington (both sides)
- Huntington and St. Botolph (both sides)
- St. Botolph and Columbus (both sides)

West Newton Street between

- St. Botolph and Columbus (both sides)

Exeter Street between

- Blagden and Huntington (west side)

Dartmouth Street between

- Boylston and St. James (both sides)

Berkeley Street between

- Newbury and Boylston (east side)
- Coldumbus and Cortess (east side)

Arlington Street between

- Commonwealth divide (west side)
- Stuart and Isabella (west side)
- Mass Pike overpass (west side)

Charles Street between

- Beacon and Under Common Garage Exit (east side)

Cabs Only

Boylston Street between

- Ring and Exeter (south side)

St. James Avenue between

Dartmouth and Trinity Place (south side)
Berkeley and Arlington (south side)

Stuart Street between

Arlington and Charles (south side)

Huntington Avenue between

West Newton and Garrison (south side)
Garrison and Harcourt (south side)
Stuart and Dartmouth (south side)

Massachusetts Avenue between

Marlborough and Commonwealth (east side)
Commonwealth and Newbury (east side)

Exeter Street between

Newbury and Boylston (west side)

Dartmouth Street between

Beacon and Marlborough (east side)

Berkeley Street between

Boylston and St. James (east side)
St. James and Stuart (west side)

Arlington Street between

Commonwealth and Newbury (west side)

Handicap Parking Only

Commonwealth Avenue between

Berkeley and Clarendon (north side)

Newbury Street between

Clarendon and Berkeley (south side)

Boylston Street between

Exeter and Fairfield (both sides)

St. James Avenue between

Berkeley and Arlington (south side)

Stuart Street between

Dartmouth and Trinity Place (south side)
Trinity Place and Clarendon (north side)
Clarendon and Berkeley (north side)

Arlington Street between

Stuart and Piedmont (east side)

Police Vehicles Only

Stuart Street between

Clarendon and Berkeley (both sides)

Berkeley Street between

Stuart and Columbus (west side)

Fire Lane

Columbus Avenue between

Berkeley and Arlington (both sides)

Reserved for Consular Corps

Commonwealth Avenue between

Arlington and Berkeley (north side)

Street Cleaning

Massachusetts Avenue between

Columbus and St. Botolph (4-7 AM)
    Monday and Thursday (west side)
    Tuesday and Friday (east side)

West Newton Street between

Columbus and St. Botolph (both sides)
Wednesday and Saturday

Loading Zone

Beacon Street between

Charles and Brimmer (north side)
Berkeley and Clarendon (north side)
Exeter and Fairfield (north side)

Marlborough Street between

Massachusetts Avenue and Hereford (south side)
Clarendon and Berkeley (south side)

Commonwealth Avenue between

Arlington and Berkeley (south side)
Fairfield and Gloucester (north side)
Hereford and Massachusetts Avenue (south side)

Newbury Street between

Massachusetts Avenue and Hereford (north side)
Gloucester and Fairfield (north side)
Exeter and Dartmouth (both sides)
Dartmouth and Clarendon (north side)
Clarendon and Berkeley (both sides)
Berkeley and Arlington (both sides)

Boylston Street between

Fairfield and Exeter (north side)
Dartmouth and Clarendon (north side)
Clarendon and Berkeley (both sides)
Berkeley and Arlington (south side)

St. James Avenue between

Clarendon and Berkeley (south side)

Stuart Street between

Dartmouth and Trinity Place (north side)
Berkeley and Arlington (south side)
Arlington and Charles (south side)

Huntington Avenue between

Massachusetts Avenue and West Newton (south side)
West Newton and Harcourt (south side)

Columbus Avenue between

Chaners and Berkeley (north side)
Berkeley and Arlington (both sides)

Appleton Street between

Clarendon and Berkeley (south side)

Massachusetts Avenue between

Marlborough and Commonwealth (east side)
Commonwealth and Newbury (east side)
Boylston and St. Germain (west side)
Huntington and St. Botolph (both sides)

Gloucester Street between

Newbury and Boylston (east side)

Fairfield Street between

Commonwealth and Newbury (west side)
Newbury and Boylston (west side)

Exeter Street between

Boylston and Columbus (west side)

Dartmouth Street between

Commonwealth and Newbury (east side)
St. James and Stuart (east side)

Clarendon Street between

Commonwealth and Newbury (west side)
Newbury and Boylston (east side)
Stuart and Columbus (east side)

Berkeley Street between

St. James and Stuart (east side)

Arlington Street between

Commonwealth and Newbury (west side)
Columbus and Piedmont (west side)
Winchester and Isabella (east side)

Loading Zone 8 AM TO 6 PM

Newbury Street between

Arlington and Berkeley (south side)
Berkeley and Clarendon (north side)
Clarendon and Dartmouth (south side)
Fairfield and Gloucester (north side)
Hereford and Massachusetts Avenue (south side)

Boylston Street between

Gloucester and Fairfield (north side)
Fairfield and Exeter (north side)
Exeter and Dartmouth (north side)

St. James Avenue between

Berkeley and Arlington (south side)

Massachusetts Avenue between

Boylston and St. Germain (west side)

West Newton Street between

Huntington and St. Botolph (east side)
St. Botolph and Columbus (east side)

Berkeley Street between

Stuart and Columbus (west side)

Arlington Street between

Beacon and Marlborough (west side)

Tow Zone

Beacon Street between

Brimmer and Embankment (both sides)

Newbury Street between

Massachusetts Avenue and Hereford (south side)
Clarendon and Berkeley (south side)

Boylston Street between

Charles and Arlington (north side)
Clarendon and Dartmouth (south side)
Dartmouth and Exeter (south side)
Hereford and Massachusetts Avenue (south side)

St. James Avenue between

Arlington and Berkeley (south side)
Clarendon and Trinity Place (south side)

Stuart Street between

Arlington and Charles (south side)

Huntington Avenue between

Massachusetts Avenue and Dartmouth (both sides)

Columbus Avenue between

Massachusetts Avenue and Greenwich Park (both sides)
Holyoke and West Canton (south side)
Cazenove and Berkeley (both sides)

Massachusetts Avenue between

Storrow Drive and Beacon (both sides)
Newbury and Boylston (both sides)
Westland and Huntington (both sides)

Hereford Street at

Commonwealth divide (both sides)

Gloucester Street at

Commonwealth divide (both sides)

Fairfield Street at

Commonwealth divide (both sides)

Exeter Street at

Commonwealth divide (both sides)

Dartmouth Street between

Storrow Drive and Beacon (both sides)
Commonwealth divide (both sides)
Boylston and St. James (west side)
Huntington and Stuart (west side)
Stuart and Columbus (both sides)

Clarendon Street between

Storrow Drive and Beacon (west side)
Beacon and Marlborough (east side)
Commonwealth divide (both sides)
Stuart and Columbus (both sides)

Berkeley Street between

Storrow Drive and Beacon (both sides)
Commonwealth divide (both sides)
Newbury and Boylston (west side)
Boylston and St. James (east side)

Embankment Road between

Storrow Drive and Beacon (both sides)

Arlington Street between

Commonwealth divide (east side)
Newbury and Boylston (both sides)

Charles Street between

Beacon and Boylston (both sides)

Tow Zone 7-9:30 AM and 4-6 PM

St. James Avenue between

Clarendon and Arlington (north side)

Stuart Street between

Berkeley and Arlington (north side)
Arlington and Charles (both sides)

Massachusetts Avenue between

Boylston and Belvidere (east side)
St. Botolph and Columbus (east side)

Clarendon Street between

Commonwealth and Stuart (both sides)

Berkeley Street between

Beacon and Marlborough, 4-6 PM only (both sides
Marlborough and alley north of Commonwealth, 4-6 PM only (both sides)
Alley north of Commonwealth and Commonwealth (west side)
Commonwealth and Newbury, 4-6 PM only (both sides)
Newbury and Boylston, 4-6 PM only (east side)
Boylston and Stuart (both sides)
Stuart and Columbus (east side)

Arlington Street between

Newbury and Boylston, 7-9:30 AM only (west side)

St. James and Stuart (both sides)

CONSTRUCTION ZONES

Boylston Street (south side) just west of Charles Street

Boylston and Exeter Streets (northeast corner)

Boylston Street (north side) east of Gloucester Street

Massachusetts Avenue and Newbury Street (southeast corner)

Massachusetts Avenue at the MBTA station between Columbus Avenue and St. Botolph Street

St. James Avenue (south side) just east of Clarendon Street

Stuart Street (north side) just east of Clarendon Street

Charles Street between Boylston and Stuart Streets

Columbus Avenue/Stuart Street/Arlington Street

Columbus Avenue (both sides) between Clarendon and Chaners Streets

APPENDIX 3

1985 PM PEAK HOUR TRAFFIC VOLUMES

CITY/TOWN- BOSTON
STREET- CLARENDON STREET

AM - DATA SUMMARY
PAGE 1 OF 2

IRECTION- SB	SUND	MOND	TUES	WEDN	THUR	FRID	SATU
EAR-- 1985	5/26	5/27	5/28	5/29	5/30	5/24	5/25
2:00-12:15 AM	59	43	32	32	51	55	52
2:15-12:30	46	32	30	35	42	37	54
2:30-12:45	45	42	14	23	163	39	54
2:45- 1:00	32	22	23	13	26	12	47
1:00- 1:15	34	24	11	14	24	25	41
1:15- 1:30	44	17	8	12	15	20	37
1:30- 1:45	29	19	16	13	12	13	25
1:45- 2:00	30	24	10	10	7	12	11
2:00- 2:15	26	13	14	7	17	9	11
2:15- 2:30	26	13	9	10	17	15	22
2:30- 2:45	26	20	6	3	7	13	14
2:45- 3:00	21	8	4	5	7	3	15
3:00- 3:15	15	12	3	7	5	12	19
3:15- 3:30	13	3	5	4	7	8	5
3:30- 3:45	6	5	2	5	2	11	12
3:45- 4:00	5	7	5	4	6	6	7
4:00- 4:15	4	5	7	3	3	7	12
4:15- 4:30	7	4	5	2	4	6	3
4:30- 4:45	2	6	7	8	4	5	9
4:45- 5:00	9	9	5	8	13	8	2
5:00- 5:15	2	3	8	9	11	12	9
5:15- 5:30	3	5	13	14	16	7	10
5:30- 5:45	10	8	20	12	16	18	13
5:45- 6:00	5	7	37	36	28	37	16
6:00- 6:15	9	12	38	35	45	27	9
6:15- 6:30	11	11	62	55	54	70	23
6:30- 6:45	11	26	63	65	75	71	19
6:45- 7:00	20	15	117	113	109	102	35
7:00- 7:15	12	17	163	159	159	137	27
7:15- 7:30	12	14	166	167	177	163	32
7:30- 7:45	20	16	199	177	172	182	22
7:45- 8:00	23	42	190	216	174	193	36
8:00- 8:15	7	22	207	206	215	215	51
8:15- 8:30	15	25	190	242	212	211	54
8:30- 8:45	21	22	187	217	196	188	62
8:45- 9:00	30	31	207	203	196	191	95
9:00- 9:15	23	39	169	177	173	167	74
9:15- 9:30	40	27	142	166	164	154	81
9:30- 9:45	43	35	133	139	139	157	124
9:45-10:00	60	43	143	152	126	131	102
0:00-10:15	53	41	121	137	145	129	123
0:15-10:30	72	52	128	112	135	132	97
0:30-10:45	64	67	115	125	133	141	82
0:45-11:00	68	49	118	144	134	135	119
1:00-11:15	67	54	142	154	146	133	97
11:15-11:30	75	70	155	117	134	148	101
1:30-11:45	76	83	151	145	155	150	102
1:45-12:00	88	73	142	136	158	137	111
AM PEAK VOLUME	306	287	791	881	809	812	457
AM PEAK	11:00-12:00	11:00-12:00	8:00- 9:00	7:45- 8:45	8:00- 9:00	7:45- 8:45	10:45-11:45
AM TOTALS	1,420	1,241	3,750	3,858	4,121	3,876	2,154

--- SIGNIFIES 'NO COMPLETE DATA' + SUBTOTAL, PARTIAL COUNT FOR PERIOD

-MM ASSOCIATES
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ITY/TOWN- BOSTON
TREET- CLARENDON STREET

PM - DATA SUMMARY
PAGE 2 OF 2

RECTION- SB	SUND	MOND	TUES	WEDN	THUR	FRID	SATU
AR-- 1985	5/26	5/27	5/28	5/29	5/30	5/24	5/25
:00-12:15 PM	75	73	119	133	154	159	127
:15-12:30	90	73	121	143	152	127	113
:30-12:45	73	81	133	123	146	131	113
:45- 1:00	99	71	127	111	139	140	113
:00- 1:15	83	103	139	118	127	121	121
:15- 1:30	106	75	100	119	133	129	125
:30- 1:45	95	79	135	107	130	141	131
:45- 2:00	83	77	115	118	144	142	94
:00- 2:15	76	74	116	130	152	151	127
:15- 2:30	78	78	115	137	153	143	113
:30- 2:45	104	83	120	156	127	130	112
:45- 3:00	89	73	117	126	131	123	110
:00- 3:15	93	78	154	154	160	144	112
:15- 3:30	90	76	141	123	141	132	126
:30- 3:45	110	74	156	132	184	143	122
:45- 4:00	104	65	146	140	149	139	99
:00- 4:15	100	52	139	167	181	167	124
:15- 4:30	86	49	139	185	146	131	94
:30- 4:45	127	58	151	150	128	148	103
:45- 5:00	80	67	147	144	157	154	119
:00- 5:15	97	94	141	149	161	129	94
:15- 5:30	96	70	175	136	172	126	93
:30- 5:45	106	92	138	184	150	143	114
:45- 6:00	97	95	139	157	195	136	80
:00- 6:15	110	88	143	132	168	140	105
:15- 6:30	94	85	151	219	194	129	123
:30- 6:45	97	92	153	160	170	138	153
:45- 7:00	95	66	141	190	161	133	104
:00- 7:15	110	94	131	172	144	143	116
:15- 7:30	108	107	148	163	151	144	125
:30- 7:45	99	90	130	153	166	136	127
:45- 8:00	73	99	114	156	130	101	104
:00- 8:15	79	74	92	128	132	141	103
:15- 8:30	81	79	74	157	96	123	122
:30- 8:45	67	66	92	99	96	90	113
:45- 9:00	78	66	93	126	90	124	125
:00- 9:15	80	64	78	112	112	116	121
:15- 9:30	89	75	96	97	102	106	99
:30- 9:45	71	90	74	106	93	107	126
:45-10:00	87	84	79	79	128	120	112
:00-10:15	62	69	83	108	101	129	110
:15-10:30	91	65	55	124	105	97	96
:30-10:45	67	69	68	139	125	94	77
:45-11:00	62	62	71	84	111	88	97
:00-11:15	53	38	55	76	81	79	76
:15-11:30	63	61	62	74	70	113	99
:30-11:45	72	29	40	50	71	118	90
:45-12:00	44	37	24	50	26	78	72
PEAK VOLUME	412	370	614	821	727	531	511
PEAK	6:45- 7:45	7:30- 8:30	4:30- 5:30	6:00- 7:00	5:45- 6:45	3:15- 4:15	6:15- 7:15
TOTALS	4.200	3,571	5,440	6.411	6.498	6,180	5.219
T	5,620	4,312	9,190	12,269	10,619	10,256	7.473

- SIGNIFIES 'NO COMPLETE DATA' + SUBTOTAL, PARTIAL COUNT FOR PERIOD

HMM ASSOCIATES

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                                                                                    ******
                                                                                    * [illegible] *
                                                                                    * [illegible] *
                                                                                    ******

 - HOUR DATA SUMMARY

ITY/TOWN- BOSTON
TREET-     CLARENDON STREET

*******************************************************************************************************
RECTION-    SB  *    SUND    *    MOND    *    TUES    *    WEDN    *    THUR    *    FRID    *    SATU    *
*******************************************************************************************************
AR--      1985  *    5/26    *    5/27    *    5/28    *    5/29    *    5/30    *    5/24    *    5/25    *
*******************************************************************************************************
:00- 1:00 AM    *     182    *     125    *      99    *     103    *     381    *     141    *     214    *
:00- 2:00       *     137    *      84    *      45    *      49    *      59    *      70    *     135    *
:00- 3:00       *     100    *      54    *      33    *      25    *      48    *      40    *      82    *
:00- 4:00       *      39    *      27    *      13    *      10    *      21    *      37    *      41    *
:00- 5:00       *      22    *      24    *      24    *      21    *      24    *      26    *      32    *
:00- 6:00       *      20    *      23    *      78    *      71    *      71    *      74    *      48    *
:00- 7:00       *      51    *      65    *     280    *     268    *     283    *     270    *      86    *
:00- 8:00       *      67    *      39    *     718    *     729    *     690    *     700    *     117    *
:00- 9:00       *      73    *     100    *     791    *     868    *     809    *     805    *     268    *
:00-10:00       *     166    *     144    *     587    *     634    *     604    *     609    *     360    *
:00-11:00       *     257    *     209    *     492    *     518    *     547    *     536    *     421    *
:00-12:00       *     306    *     287    *     590    *     552    *     585    *     568    *     430    *
:00- 1:00 PM   -*     334    *     300    *     470    *     521    *     599    *     550    *     499    *
:00- 2:00       *     369    *     337    *     459    *     464    *     539    *     574    *     452    *
:00- 3:00       *     387    *     325    *     468    *     549    *     563    *     567    *     474    *
:00- 4:00       *     397    *     193    *     597    *     569    *     634    *     608    *     439    *
:00- 5:00       *     373    *     256    *     576    *     648    *     612    *     600    *     439    *
:00- 6:00       *     396    *     351    *     393    *     626    *     678    *     534    *     361    *
:00- 7:00       *     396    *     331    *     588    *     521    *     693    *     540    *     512    *
:00- 8:00       *     390    *     370    *     523    *     644    *     601    *     524    *     452    *
:00- 9:00       *     307    *     185    *     351    *     492    *     414    *     432    *     429    *
:00-10:00       *     327    *     313    *     317    *     394    *     415    *     449    *     419    *
:00-11:00       *     282    *     265    *     277    *     435    *     442    *     388    *     372    *
:00-12:00       *     242    *     165    *     181    *     150    *     308    *     420    *     356    *
*******************************************************************************************************
T               *   5,620    *   4,812    *   9,190    *  10,169    *  10,619    *  10,256    *   7,470    *
*******************************************************************************************************
- SIGNIFIES 'NO COMPLETE DATA'       + SUBTOTAL, PARTIAL COUNT FOR PERIOD                    PMM ASSOCIATES
                                                                              TRANSOFT I, COPYRIGHT 1982
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ITY/TOWN- BOSTON
TREET- BERKELEY STREET

AM - DATA SUMMARY
PAGE 1 OF 2

ECTION- [illegible]	SUND	MOND	TUES	WEDN	THUR	FRID	SATU
-R-- 1985	5/26	5/27	5/28	5/29	5/30	5/31	[illegible]
:00-12:15 AM	133	57	33	112	122	111	101
:15-12:30	121	32	32	57	79	72	[illegible]
:30-12:45	111	57	43	51	72	55	33
:45- 1:00	107	73	37	47	72	77	[illegible]
:00- 1:15	121	57	43	33	52	73	[illegible]
:15- 1:30	74	52	24	45	47	73	33
:30- 1:45	39	51	13	13	44	37	15
:45- 2:00	75	49	13	22	42	47	31
:00- 2:15	149	72	41	45	44	61	[illegible]
:15- 2:30	113	76	19	31	59	65	57
:30- 2:45	37	57	21	19	27	43	51
:45- 3:00	32	41	15	25	27	29	53
:00- 3:15	32	21	12	17	19	32	32
:15- 3:30	16	23	19	12	16	24	21
:30- 3:45	14	33	12	14	13	14	[illegible]
:45- 4:00	33	23	21	12	14	13	23
:00- 4:15	17	13	9	11	9	14	12
:15- 4:30	14	13	7	12	11	14	17
:30- 4:45	19	13	11	15	9	7	21
:45- 5:00	25	14	17	14	9	10	23
:00- 5:15	16	16	17	10	14	10	14
:15- 5:30	12	9	13	12	20	15	23
:30- 5:45	14	12	23	18	41	15	14
:45- 6:00	15	20	34	42	94	47	24
:00- 6:15	19	31	69	57	73	67	13
:15- 6:30	22	18	103	93	114	108	42
:30- 6:45	37	19	136	107	134	126	41
:45- 7:00	38	32	132	145	145	143	49
:00- 7:15	34	32	147	151	147	138	59
:15- 7:30	35	34	173	163	163	168	56
:30- 7:45	41	33	184	181	165	195	73
:45- 8:00	35	60	199	202	115	202	61
:00- 8:15	33	36	203	207	203	203	73
:15- 8:30	51	45	212	212	214	194	56
:30- 8:45	53	42	219	214	236	155	132
:45- 9:00	54	35	211	211	226	203	99
:00- 9:15	54	51	221	199	188	215	112
:15- 9:30	57	59	202	186	193	194	124
:30- 9:45	61	78	173	173	171	195	113
:45-10:00	94	82	159	190	193	179	153
:00-10:15	88	95	205	177	193	177	177
:15-10:30	94	94	202	191	189	199	132
:30-10:45	94	95	203	205	173	198	156
:45-11:00	104	115	181	191	125	225	142
:00-11:15	95	98	195	203	191	212	145
:15-11:30	110	128	171	200	186	221	191
:30-11:45	111	124	182	226	181	211	176
:45-12:00	113	113	191	193	184	219	162
PEAK VOLUME	553	446	872	852	837	862	573
PEAK	12:00- 1:00	10:45-11:45	8:15- 9:15	8:00- 9:00	7:45- 8:45	11:00-12:00	11:00-12:00
TOTALS	3,211	2,537	4,893	5,064	5,277	5,406	3,912

- SIGNIFIES 'NO COMPLETE DATA'   + SUBTOTAL, PARTIAL COUNT FOR PERIOD

HMM ASSOCIATES

TRANSOFT I. COPYRIGHT 1982

ITY/TOWN- BOSTON
TREET- BERKELEY STREET

PM - DATA SUMMARY
PAGE 2 OF 2

RECTION- NB	SUND	MOND	TUES	WEDN	THUR	FRID	SATU
AR-- 1985	5/26	5/27	5/28	5/29	5/30	5/31	6/01
:00-12:15 PM	139	113	177	193	121	113	155
:15-12:30	157	117	179	122	122	127	132
:30-12:45	194	111	137	135	122	136	155
:45- 1:00	162	149	122	161	179	133	113
:00- 1:15	133	113	152	169	113	170	172
:15- 1:30	133	131	126	132	112	121	112
:30- 1:45	144	121	133	177	139	125	133
:45- 2:00	157	123	172	135	225	123	119
:00- 2:15	151	141	112	233	113	123	143
:15- 2:30	174	121	151	141	155	144	133
:30- 2:45	121	113	203	223	225	142	164
:45- 3:00	136	127	237	214	233	267	171
:00- 3:15	125	136	152	267	257	145	131
:15- 3:30	136	121	128	263	251	172	159
:30- 3:45	127	113	259	238	257	252	152
:45- 4:00	132	123	129	238	242	246	152
:00- 4:15	144	115	157	252	263	164	212
:15- 4:30	138	121	162	267	238	180	195
:30- 4:45	123	125	161	144	263	266	177
:45- 5:00	131	116	228	240	254	150	173
:00- 5:15	115	111	127	231	250	234	166
:15- 5:30	153	132	189	257	263	255	165
:30- 5:45	141	132	243	237	261	245	197
:45- 6:00	112	151	227	247	211	211	149
:00- 6:15	133	114	251	217	233	225	158
:15- 6:30	114	114	261	251	245	214	120
:30- 6:45	113	113	199	215	194	192	130
:45- 7:00	113	121	214	211	225	175	127
:00- 7:15	122	119	221	195	225	199	122
:15- 7:30	98	122	222	195	164	176	132
:30- 7:45	111	121	173	199	222	192	115
:45- 8:00	73	130	176	214	184	155	122
:00- 8:15	121	102	148	123	197	134	95
:15- 8:30	121	112	122	173	192	146	96
:30- 8:45	113	59	148	171	137	157	124
:45- 9:00	102	126	114	158	125	122	97
:00- 9:15	82	97	139	163	153	132	96
:15- 9:30	97	129	165	193	125	159	116
:30- 9:45	99	112	147	112	156	142	112
:45-10:00	150	130	130	190	154	150	140
:00-10:15	96	116	151	135	167	142	119
:15-10:30	115	112	153	136	154	137	144
:30-10:45	102	96	138	127	142	157	111
:45-11:00	97	105	123	166	142	131	142
:00-11:15	126	98	112	168	138	141	139
:15-11:30	116	113	127	129	127	112	140
:30-11:45	95	71	97	110	104	116	174
:45-12:00	121	79	54	111	157	92	134
PEAK VOLUME	638	530	1089	1011	1031	1060	757
PEAK	12:15- 1:15	5:15- 6:15	3:45- 4:45	3:00- 4:00	4:30- 5:30	4:00- 5:00	3:45- 4:45
TOTALS	5,971	5,236	9,390	9,952	9,836	9,337	7,174
T	9,182	8,143	13,753	15,015	15,113	14,743	11,186

- SIGNIFIES 'NO COMPLETE DATA'   + SUBTOTAL, PARTIAL COUNT FOR PERIOD

M ASSOCIATES

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                                                                              ******
                                                                              *  [illegible]  *
                                                                              * [illegible] *
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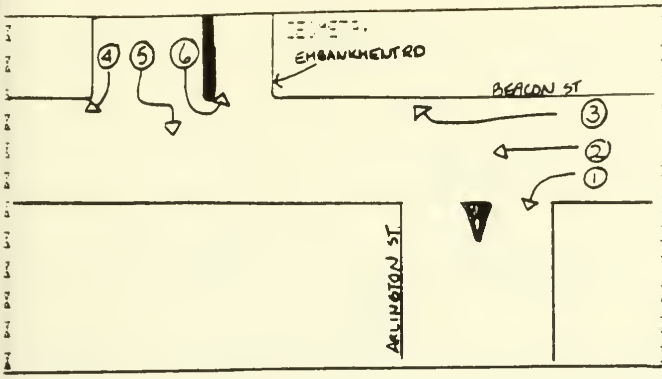
 - HOUR DATA SUMMARY

ITY/TOWN-  BOSTON
TREET-     BERKELEY STREET

*******************************************************************************************
RECTION-   NB  *   SUND   *   MOND   *   TUES   *   WEDN   *   THUR   *   FRID   *   SATU   *
*******************************************************************************************
AR--     1985  *   5/26   *   5/27   *   5/28   *   5/29   *   5/30   *   5/31   *   6/01   *
*******************************************************************************************
:00- 1:00 AM   *    553   *    316   *    220   *    307   *    365   *    401   *    275   *
:00- 2:00      *    383   *    216   *    114   *    159   *    100   *    149   *    338   *
:00- 3:00      *    424   *    143   *     97   *    110   *    157   *    120   *    312   *
:00- 4:00      *    133   *    125   *     63   *     53   *     67   *     37   *    152   *
:00- 5:00      *     38   *     58   *     44   *     51   *     38   *     44   *     94   *
:00- 6:00      *     64   *     58   *     96   *     93   *    158   *     37   *     84   *
:00- 7:00      *    115   *    121   *    412   *    407   *    467   *    421   *    159   *
:00- 8:00      *    145   *    138   *    783   *    697   *    720   *    784   *    170   *
:00- 9:00      *    192   *    158   *    854   *    852   *    878   *    795   *    365   *
:00-10:00      *    275   *    270   *    756   *    758   *    745   *    784   *    496   *
:00-11:00      *    371   *    399   *    791   *    764   *    740   *    779   *    655   *
:00-12:00      *    443   *    444   *    741   *    801   *    742   *    862   *    573   *
:00- 1:00 PM   *    646   *    502   *    783   *    782   *    825   *    846   *    596   *
:00- 2:00      *    583   *    489   *    786   *    751   *    852   *    835   *    575   *
:00- 3:00      *    542   *    518   *    881   *    911   *    929   *    973   *    549   *
:00- 4:00      *    528   *    471   *    965   *   1011   *   1086   *   1016   *    702   *
:00- 5:00      *    536   *    458   *   1008   *   1202   *   1019   *   1060   *    759   *
:00- 6:00      *    531   *    527   *    886   *    972   *    985   *    946   *    676   *
:00- 7:00      *    463   *    472   *    924   *    894   *    897   *    772   *    594   *
:00- 8:00      *    401   *    492   *    753   *    793   *    773   *    712   *    497   *
:00- 9:00      *    440   *    419   *    532   *    705   *    781   *    559   *    392   *
:00-10:00      *    429   *    467   *    581   *    756   *    627   *    592   *    482   *
:00-11:00      *    410   *    429   *    571   *    854   *    636   *    575   *    513   *
:00-12:00      *    421   *    362   *    419   *    518   *    527   *    460   *    527   *
*******************************************************************************************
T              *  9,182   *  8,143   * 13,983   * 15,015   * 15,113   * 14,743   * 11,136   *
*******************************************************************************************
- SIGNIFIES 'NO COMPLETE DATA'      + SUBTOTAL, PARTIAL COUNT FOR PERIOD        HMM ASSOCIATES
                                                                   TRANSOFT I. COPYRIGHT 1982
```

HMM ASSOCIATES
COUNTSUM®
TRAFFIC ANALYSIS



15 MAY 1985 [illegible]

DAY OF WEEK: WEDNESDAY WEATHER: FAIR [illegible]

INTERSECTION: BEACON-ARLINGTON-EMBANKMENT

REMARKS:

PEAK HOUR AT THIS LOCATION: 5:00-6:00 PM

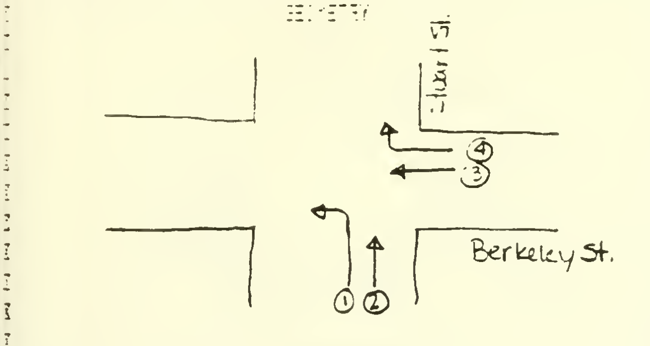
PEAK HOUR FOR THE STUDY AREA: 4:30-5:30 PM

VEHICLE COUNT

	1		2		3		4		5		6	
TIME PERIOD	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS
4:00-4:15 PM	110	7	128	4	71	1	123	0	218	2	38	0
4:15-4:30 PM	155	4	211	4	64	2	131	1	160	3	17	0
4:30-4:45 PM	157	5	105	3	111	1	130	0	172	1	23	0
4:45-5:00 PM	115	1	190	1	79	2	121	3	151	0	43	2
5:00-5:15 PM	157	5	211	3	135	3	179	0	159	0	36	0
5:15-5:30 PM	178	3	240	2	59	0	127	2	137	0	27	0
5:30-5:45 PM	134	3	144	2	72	1	125	0	139	2	45	2
5:45-6:00 PM	163	7	197	2	75	0	135	2	123	2	33	2
STUDY AREA PEAK HOUR VOLUMES												
TOTAL: VEHICLES	1295		557		419		541		558		129	
% TRUCKS		1%		1%		1%		1%		0%		2%

PAGE 2 OF 3

HMM ASSOCIATES
COUNTSUM9
TRAFFIC ANALYSIS



[illegible]

DAY OF WEEK: WED THUR   WEATHER: [illegible]

INTERSECTION: STUART BERKELEY

REMARKS:

PEAK HOUR AT THIS LOCATION: 4:30-5:30 PM

PEAK HOUR FOR THE STUDY AREA: 4:30-5:30 PM

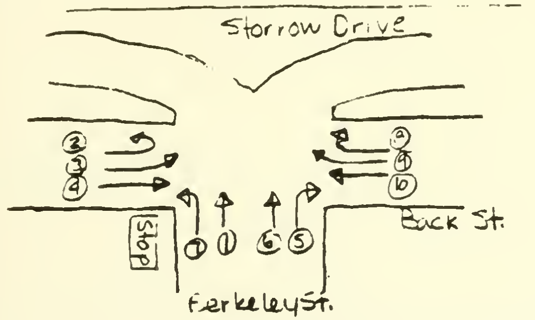
VEHICLE COUNT

	1		2		3		4		5		6	
TIME PERIOD	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS
4:00-4:15 PM	47	2	107	4	191	9	11	1				
4:15-4:30 PM	69	1	126	6	195	9	12	2				
4:30-4:45 PM	37	0	121	5	213	3	14	1				
4:45-5:00 PM	47	1	114	6	199	3	15	3				
5:00-5:15 PM	55	1	117	5	193	7	10	0				
5:15-5:30 PM	51	1	98	7	192	3	9	3				
5:30-5:45 PM	43	0	133	2	211	3	12	1				
5:45-6:00 PM	37	0	106	6	155	4	15	1				
STUDY AREA PEAK HOUR VOLUMES												
TOTAL: VEHICLES	193		475		813		56					
% TRUCKS		2%		5%		2%		13%				

PAGE 3 OF 3

HMM ASSOCIATES
COUNTSUM©
TRAFFIC ANALYSIS

GEOMETRY



[illegible]

DAY OF WEEK: WED THUR   WEATHER: [illegible]   RECORDED [illegible]

INTERSECTION: BACK ST STORROW DR

REMARKS:

PEAK HOUR AT THIS LOCATION: 4:30-5:30 PM

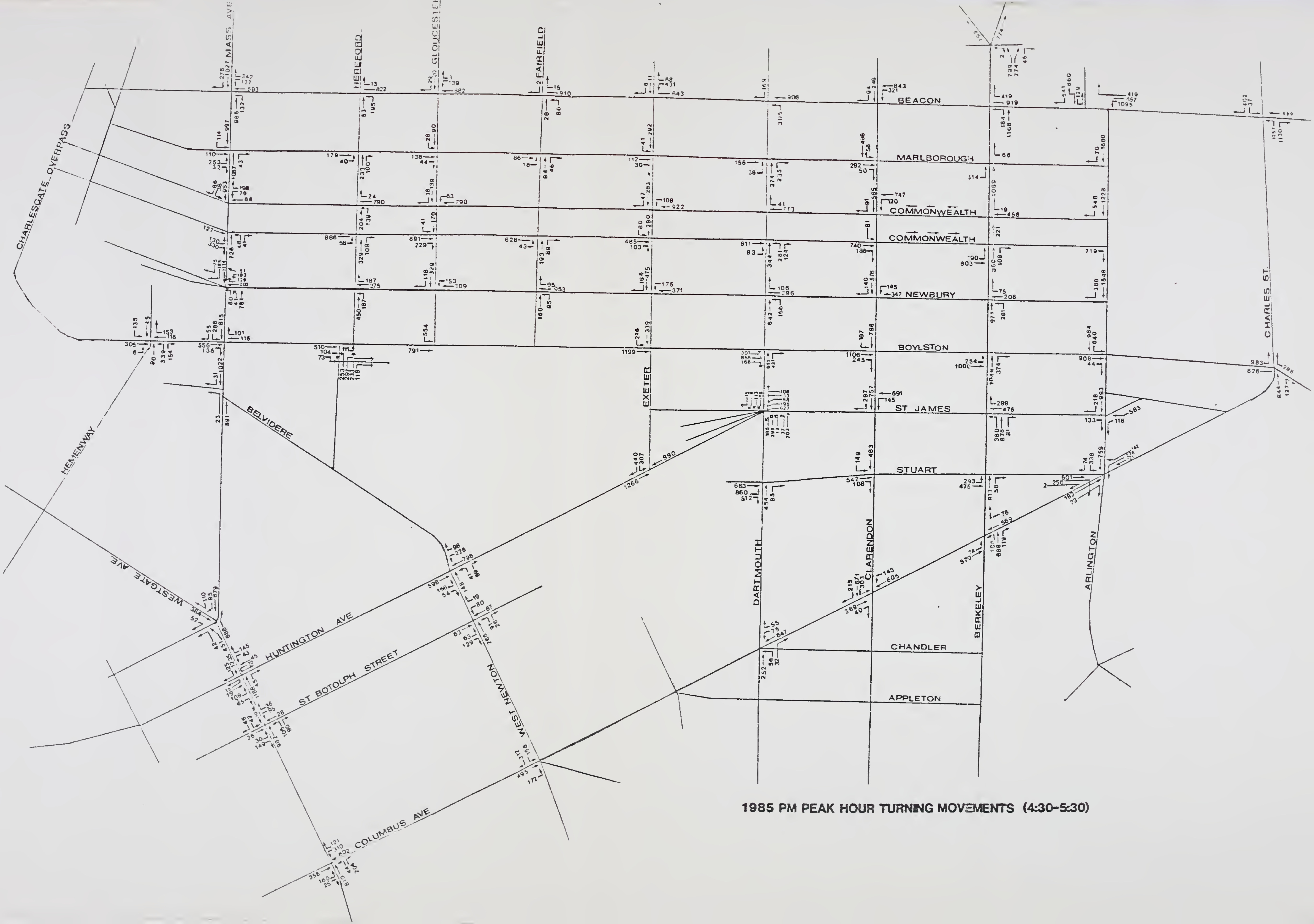
PEAK HOUR FOR THE STUDY AREA: 4:30-5:30 PM

VEHICLE COUNT

	1		2		3		4		5		6	
TIME PERIOD	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS
4:00-4:15 PM	178	0	3	0	22	0	4	0	4	0	226	1
4:15-4:30 PM	172	0	7	0	21	0	9	0	7	0	190	0
4:30-4:45 PM	131	0	6	0	22	0	12	0	19	0	214	1
4:45-5:00 PM	127	2	11	0	16	0	3	0	5	0	195	1
5:00-5:15 PM	113	0	1	2	14	2	16	0	10	1	193	0
5:15-5:30 PM	121	0	4	0	14	0	10	0	11	1	172	2
5:30-5:45 PM	125	0	5	0	22	0	4	0	9	0	180	1
5:45-6:00 PM	120	2	6	0	15	2	1	2	12	0	156	1
STUDY AREA PEAK HOUR VOLUMES												
TOTAL: VEHICLES	[illegible]		22		66		41		45		774	
% TRUCKS		0%		0%		0%		0%		4%		0%

VEHICLE COUNT

	7		8		9		10		11		12	
TIME PERIOD	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS	AUTOS	TRCKS
4:00-4:15 PM	1	0	0	0	0	0	1	0				
4:15-4:30 PM	1	0	0	0	1	0	1	0				
4:30-4:45 PM	1	0	1	0	1	0	0	0				
4:45-5:00 PM	0	0	1	0	1	0	1	0				
5:00-5:15 PM	0	0	0	0	1	0	0	0				
5:15-5:30 PM	1	0	0	0	1	0	1	0				
5:30-5:45 PM	0	0	0	0	0	0	0	0				
5:45-6:00 PM	1	0	0	0	0	0	0	0				
STUDY AREA PEAK HOUR VOLUMES												
TOTAL: VEHICLES	2		2		3		2					
% TRUCKS		0%		0%		0%		0%				



1985 PM PEAK HOUR TURNING MOVEMENTS (4:30-5:30)

APPENDIX 4

1985 PM PEAK HOUR INTERSECTION OPERATIONS CALCULATIONS

```
                                   H M M  ASSOCIATES

[illegible] TRAFFIC
CHARLES ST.   CHARLES ST.                                                    [illegible]
BOYLSTON ST.   BOYLSTON ST.
WEEKDAY   PM PEAK   1985


                          VOLUME ALLOCATION TO LANES

TRAFFIC        LANE 1               LANE 2               LANE 3               LANE 4
 FROM       L     S     R       L     S     R       L     S     R       L     S     R
-------   -----------------   -----------------   -----------------   -----------------

 NORTH      0     0     0       0     0     0       0     0     0       0     0
  EAST      0     0     0       0     0     0       0     0     0       0     0     0
 SOUTH      0   211     0       0   211     0       0   211     0       0     0     0
  WEST    360     0     0     295     0     0       0   413     0       0   413     0


              LEFT TURN CHECK

TRAFFIC         LEFT TURN          PHASE
 FROM      CAPACITY   VOLUME      NEEDED?
-------    ----------------      -------

 NORTH         60         0         N
  WEST        872       360         Y

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.34
            EAST/WEST     0.66


                                    PLANNING

PHASE      TRAFFIC      MOVE   CRITICAL      PERCENT        EFFECTIVE     AVERAGE
            FROM        MENT    VOLUME    CAPACITY USED    GREEN TIME     DELAY
-----    -----------    ----   --------   -------------    ----------    -------

  1      NORTH/SOUTH    ALL      211          14.8             28            26

  2       WEST          ALL      360          25.3             47            14

  3       EAST/ WEST    ALL       53           3.7              7            47




                     TOTALS      624          43.8             82
           LEVEL OF SERVICE       A
```

```
                               H P M  ASSOCIATES

BACK BAY TRAFFIC                                                       MLI SOLPH
CHARLES ST.    CHARLES ST.                                             12-85
BOYLSTON ST.    BOYLSTON ST.
WEEKDAY    PM PEAK    1985


                         VOLUME ALLOCATION TO LANES

TRAFFIC       LANE 1              LANE 2              LANE 3              LANE 4
 FROM       L     S     R      L     S     R       L     S     R       L     S     R
-------   -----------------   -----------------   -----------------   -----------------

 NORTH      0     0     0      0     0     0       0     0     0       0     0     0
  EAST      0     0     0      0     0     0       0     0     0       0     0     0
 SOUTH      0   294     0      0   294     0       0   294     0       0     0     0
  WEST    522     0     0    427     0     0       0   413     0       0   413     0


            LEFT TURN CHECK

TRAFFIC       LEFT TURN         PHASE
 FROM     CAPACITY   VOLUME    NEEDED?
-------   ----------------   --------

 NORTH       30         0        Y
  WEST      848       522        N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.36
            EAST/WEST     0.64


                              PLANNING

PHASE     TRAFFIC      MOVE   CRITICAL     PERCENT        EFFECTIVE    AVERAGE
           FROM        MENT    VOLUME   CAPACITY USED    GREEN TIME     DELAY
-----   -----------   ----   --------   -------------   ----------   -------

  1     NORTH          ALL       0          0.0

  2     NORTH/SOUTH    ALL     294         20.6             30           27

  3      EAST/ WEST    ALL     522         36.6             52           13




                  TOTALS       816         57.2             82
          LEVEL OF SERVICE      A
```

```
                              [illegible] ASSOCIATES

BACK BAY TRAFFIC                                                         [illegible]
CHARLES ST.    CHARLES ST.                                               [illegible]
BOYLSTON ST.    BOYLSTON ST.
WEEKDAY    PM PEAK    1985


                     VOLUME ALLOCATION TO LANES

TRAFFIC       LANE 1               LANE 2               LANE 3               LANE 4
 FROM      L     S     R        L     S     R        L     S     R        L     S     R
-------  -----------------   -----------------   -----------------   -----------------

 NORTH     0     0     0        0     0     0        0     0     0        0     0     0
  EAST     0     0     0        0     0     0        0     0     0        0     0     0
 SOUTH     0   211     0        0   211     0        0   211     0        0     0     0
  WEST   360     0     0      295     0     0        0   413     0        0   413     0


             LEFT TURN CHECK

TRAFFIC        LEFT TURN         PHASE
 FROM     CAPACITY    VOLUME    NEEDED?
-------   ----------------     -------

 NORTH       80          0         Y
  WEST      872        360         N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.34
            EAST/WEST     0.66


                                 PLANNING

PHASE     TRAFFIC      MOVE    CRITICAL      PERCENT        EFFECTIVE    AVERAGE
           FROM        MENT     VOLUME    CAPACITY USED    GREEN TIME     DELAY
-----   -----------    ----    --------   -------------    ----------    -------

  1     NORTH           ALL         0           0.0

  2     NORTH/SOUTH     ALL       211          14.8             28            26

  3      EAST/ WEST     ALL       413          29.0             54            10



                  TOTALS          624          43.8             82
          LEVEL OF SERVICE         A
```

```
                                   H M M ASSOCIATES

CASE 8A   TRAFFIC
CHARLES ST.    CHARLES ST.
BOYLSTON ST.    BOYLSTON ST.
WEEKDAY    PM PEAK    1985


                         VOLUME ALLOCATION  4 LANES

TRAFFIC        LANE 1                LANE 2                LANE 3                LANE 4
 FROM       L     S     R        L     S     R        L     S     R        L     S     R
--------   -----------------    -----------------    -----------------    --------------

 NORTH      0     0     0        0     0     0        0     0     0        0     0     0
  EAST      0     0     0        0     0     0        0     0     0        0     0     0
 SOUTH      0   251     0        0   251     0        0   251     0        0     0     0
  WEST    409     0     0      334     0     0        0   413     0        0   413     0


             LEFT TURN CHECK

TRAFFIC         LEFT TURN         PHASE
 FROM      CAPACITY    VOLUME    NEEDED?
--------   --------------------  --------

 NORTH        80          0         Y
  WEST       824        409         N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.38
            EAST/WEST     0.62


                                    PLANNING

PHASE      TRAFFIC       MOVE   CRITICAL       PERCENT         EFFECTIVE     AVERAGE
            FROM         MENT    VOLUME    CAPACITY USED     GREEN TIME      DELAY
-----   -----------      ----   --------   -------------    -----------    --------

  1     NORTH             ALL        0            0.0

  2     NORTH/SOUTH       ALL      251           17.6             31             24

  3      EAST/ WEST       ALL      413           29.0             51             11



                    TOTALS         664           46.6             82
           LEVEL OF SERVICE         A
```

```
                                        H M M  ASSOCIATES

[illegible]
CHARLES ST.    CHARLES ST.
BEACON ST.     BEACON ST.
WEEKDAY    PM PEAK    1985


                               VOLUME ALLOCATION TO LANES

TRAFFIC         LANE 1                 LANE 2                 LANE 3                 LANE 4
 FROM      L      S      R        L      S      R        L      S      R        L      S      R
-------  --------------------   --------------------   --------------------   --------------------

 NORTH     0      0      0        0      0      0        0      0      0        0      0      0
  EAST     0      0      0        0      0      0        0      0      0        0      0      0
 SOUTH     0      0      0        0      0      0        0      0    904        0      0      0
  WEST    37      0      0        0      0    402        0      0      0        0      0      0


                LEFT TURN CHECK

TRAFFIC         LEFT TURN          PHASE
 FROM       CAPACITY   VOLUME     NEEDED?
-------     ------------------    -------

 NORTH          80         0         N
 SOUTH         908         0         N
  WEST         452        37         N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.69
            EAST/WEST     0.31


                                          PLANNING

PHASE       TRAFFIC        MOVE   CRITICAL       PERCENT        EFFECTIVE    AVERAGE
             FROM          MENT    VOLUME    CAPACITY USED     GREEN TIME     DELAY
-----    ------------      ----   --------   --------------    ----------    -------

  1       NORTH/SOUTH       ALL      904          60.3              58          17

  2        EAST/ WEST       ALL      402          26.8              26          41




                        TOTALS      1306          87.1              84
               LEVEL OF SERVICE       D
```

```
                                        H M M  ASSOCIATES

[illegible]
CHARLES ST.   CHARLES ST.
BEACON ST.    BEACON ST.
WEEKDAY    PM PEAK    1985


                              VOLUME ALLOCATION TO LANES

TRAFFIC       LANE 1                  LANE 2                LANE 3                LANE 4
 FROM      L      T      R        L      T      R        L      T      R        L      T      R
-------  ------------------      -----------------      ------------------     ------------------

NORTH      0      0      0        0      0      0        0      0      0
 EAST      0      0      0        0      0      0        0      0      0        0      0      0
SOUTH      0      0      0        0      0      0        0      0   1058        0      0      0
 WEST     37      0      0        0      0    402        0      0      0        0      0      0


                LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM      CAPACITY   VOLUME     NEEDED?
-------    ----------------      -------

NORTH          80          0        N
SOUTH         944          0        N
 WEST         416         37        N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH    0.72
           EAST/WEST      0.28


                                          PLANNING

PHASE      TRAFFIC       MOVE    CRITICAL       PERCENT         EFFECTIVE      AVERAGE
             FROM        MENT     VOLUME     CAPACITY USED     GREEN TIME       DELAY
-----    -----------     ----    --------    -------------     ----------     -------

  1      NORTH/SOUTH      ALL      1058           70.5

  2       EAST/ WEST      ALL       402           26.8




                       TOTALS      1460           97.3
               LEVEL OF SERVICE      E
```

```
                                        H M H  ASSOCIATES

[illegible]
CHARLES ST.    CHARLES ST.
BEACON ST.     BEACON ST.
WEEKDAY    PM PEAK    1985


                              VOLUME ALLOCATION TO LANES

TRAFFIC         LANE 1                LANE 2                LANE 3                LANE 4
 FROM         L      S            L      S      R       L      S      R       L      S
-------    ------------------   ------------------   ------------------   ------------------

 NORTH        0      0      0     0      0      0       0      0      0       0      0
  EAST        0      0      0     0      0      0       0      0      0       0      0
 SOUTH        0      0      0     0      0      0       0      0    904       0      0      0
  WEST       37      0      0     0      0    402       0      0      0       0      0      0


                LEFT TURN CHECK

TRAFFIC          LEFT  TURN          PHASE
 FROM       CAPACITY    VOLUME      NEEDED?
-------     -----------------      -------

 NORTH          80          0          N
 SOUTH         908          0          N
  WEST         452         37          N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.69
            EAST/WEST     0.31



                                        PLANNING

PHASE        TRAFFIC        MOVE    CRITICAL       PERCENT          EFFECTIVE     AVERAGE
              FROM          MENT     VOLUME     CAPACITY USED      GREEN TIME      DELAY
-----     ------------      ----    --------    --------------     ----------    -------

  1       NORTH/SOUTH       ALL       904           60.3               58            1[illegible]

  2        EAST/ WEST       ALL       402           26.8               26            41




                       TOTALS        1306           87.1               84
             LEVEL OF SERVICE          D
```

```
                              H M M  ASSOCIATES

[illegible]
CHARLES ST.   CHARLES ST.
BEACON ST.    BEACON ST.
WEEKDAY   PM PEAK   1985


                       VOLUME ALLOCATED TO LANES

TRAFFIC      LANE 1              LANE 2              LANE                LANE
 FROM      L    S    R        L    S    R        L    S    R        L    S    R
-------   --------------    ---------------    ---------------    ---------------

 NORTH     0    0    0        0    0    0        0    0    0        0
  EAST     0    0    0        0    0    0        0    0    0        0    0    0
 SOUTH     0    0    0        0    0    0        0    0  904        0    0    0
  WEST    37    0    0        0    0  402        0    0    0        0    0    0


             LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM      CAPACITY   VOLUME     NEEDED?
-------    ----------------     -------

 NORTH         30         0         N
 SOUTH        908         0         N
  WEST        462        37         N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH SOUTH   0.69
            EAST/WEST     0.31


                                 PLANNING

PHASE      TRAFFIC       MOVE   CRITICAL       PERCENT        EFFECTIVE     AVERAGE
            FROM         MENT    VOLUME    CAPACITY USED     GREEN TIME      DELAY
-----   ------------     ----   --------   -------------     ----------    --------

  1      NORTH/SOUTH     ALL       904          60.3             58            17

  2       EAST/ WEST     ALL       402          26.8             26            41



                     TOTALS       1306          87.1             84
            LEVEL OF SERVICE         D
```

```
                                    H M M  ASSOCIATES

[illegible]
ARLINGTON ST.    ARLINGTON ST.                                                  [illegible]
BEACON ST.    BEACON ST.
WEEKDAY    PM PEAK    1985


                              VOLUME ALLOCATION TO LANES

TRAFFIC         LANE 1               LANE 2                LANE 3               LANE 4
 FROM       L      S      R      L      S      R      L      S      R      L      S      R
-------   --------------------  --------------------  --------------------  ---------

 NORTH      0      0      0      0      0      0      0      0    541      0      0      0
  EAST      0    638      0      0    638      0      0      0      0      0      0      0
 SOUTH      0      0      0      0      0      0      0      0      0      0      0      0
  WEST      0      0      0      0      0      0      0      0      0      0      0      0


                LEFT TURN CHECK

TRAFFIC         LEFT TURN          PHASE
 FROM       CAPACITY   VOLUME     NEEDED?
-------     ----------------     -------

 NORTH         632         0          Y

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.46
            EAST/WEST     0.54


                                          PLANNING

PHASE      TRAFFIC       MOVE    CRITICAL       PERCENT          EFFECTIVE      AVERAGE
            FROM         MENT     VOLUME     CAPACITY USED      GREEN TIME       DELAY
-----   -----------      ----    --------    -------------      ----------      -------

  1     NORTH             ALL         0           0.0

  2     NORTH/SOUTH       ALL       541          38.0               38          [illegible]

  3      EAST/ WEST       ALL       638          44.8               44              13



                      TOTALS       1179          82.8               82
            LEVEL OF SERVICE          D
```

```
                              H S H  ASSOCIATES

BACK BAY TRAFFIC                                                      [illegible]
ARLINGTON ST.    ARLINGTON ST.                                        [illegible] 2/85
BEACON ST.    BEACON ST.
WEEKDAY    PM PEAK    1985


                         VOLUME ALLOCATION TO LANES

TRAFFIC      LANE 1             LANE 2             LANE 3             LANE 4
 FROM     L     S     R      L     S     R      L     S     R      L     S     R
-------  -----------------  -----------------  -----------------  -----------------

 NORTH    0     0     0      0     0     0      0     0   541      0     0     0
  EAST    0   929     0      0   929     0      0     0     0      0     0     0
 SOUTH    0     0     0      0     0     0      0     0     0      0     0     0
  WEST    0     0     0      0     0     0      0     0     0      0     0     0


             LEFT TURN CHECK

TRAFFIC          LEFT TURN           PHASE
 FROM       CAPACITY    VOLUME      NEEDED?
-------     ----------------        -------

 NORTH          524          0         Y

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.37
            EAST/WEST     0.63


                                  PLANNING

PHASE      TRAFFIC      MOVE   CRITICAL      PERCENT       EFFECTIVE    AVERAGE
            FROM        MENT    VOLUME    CAPACITY USED    GREEN TIME    DELAY
-----   -----------     ----   --------   -------------    ----------   -------

  1       NORTH          ALL         0          0.0

  2       NORTH/SOUTH    ALL       541         38.0

  3        EAST/ WEST    ALL       929         65.2



                  TOTALS        1470          103.2
           LEVEL OF SERVICE    FAILURE
```

```
                         [illegible] ASSOCIATES

BACK BAY TRAFFIC                                                    [illegible]
ARLINGTON ST.    ARLINGTON ST.                                      [illegible]
BEACON ST.    BEACON ST.
WEEKDAY    PM PEAK    1985


                  VOLUME ALLOCATION TO LANES

TRAFFIC      LANE 1              LANE 2              LANE 3              LANE 4
 FROM     L     S     R       L     S     R       L     S     R       L     S     R
-------   ---------------     ---------------     ---------------     ---------------

 NORTH    0     0     0       0     0     0       0     0    541      0     0     0
  EAST    0    638    0       0    638    0       0     0     0       0     0     0
 SOUTH    0     0     0       0     0     0       0     0     0       0     0     0
  WEST    0     0     0       0     0     0       0     0     0       0     0     0


          LEFT TURN CHECK

TRAFFIC      LEFT TURN          PHASE
 FROM     CAPACITY   VOLUME    NEEDED?
-------   ------------------   -------

 NORTH       632         0        Y

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.46
            EAST/WEST     0.54


                          PLANNING

PHASE     TRAFFIC     MOVE   CRITICAL     PERCENT       EFFECTIVE   AVERAGE
           FROM       MENT    VOLUME   CAPACITY USED   GREEN TIME    DELAY
-----   -----------   ----   --------  -------------   ----------   -------

  1     NORTH          ALL       0          0.0

  2     NORTH/SOUTH    ALL      541        38.0            38          24

  3      EAST/ WEST    ALL      638        44.8            44          23



                 TOTALS        1179        82.8            82
         LEVEL OF SERVICE        D
```

```
                              [illegible]

BACK BAY TRAFFIC                                                        [illegible]
ARLINGTON ST.    ARLINGTON ST.
BEACON ST.    BEACON ST.
WEEKDAY    PM PEAK    1985


                         VOLUME ALLOCATION TO LANES

TRAFFIC       LANE 1              LANE 2              LANE 3              LANE 4
 FROM      L     S     R       L     S     R       L     S     R       L     S     R
-------   -----------------   -----------------   -----------------   -----------------

 NORTH     0     0     0       0     0     0       0     0   541       0     0     0
  EAST     0   785     0       0   785     0       0     0     0       0     0     0
 SOUTH     0     0     0       0     0     0       0     0     0       0     0     0
  WEST     0     0     0       0     0     0       0     0     0       0     0     0


             LEFT TURN CHECK

TRAFFIC        LEFT TURN         PHASE
 FROM      CAPACITY   VOLUME    NEEDED?
-------    ----------------    -------

 NORTH        572         0        Y

CYCLE LENGTH :  90 SECONDS

G/C RATIO : NORTH/SOUTH  0.41
            EAST/WEST    0.59


                                  PLANNING

PHASE     TRAFFIC      MOVE   CRITICAL     PERCENT       EFFECTIVE    AVERAGE
           FROM        MENT    VOLUME   CAPACITY USED    GREEN TIME    DELAY
-----   -----------    ----   --------  -------------   ----------   -------

  1     NORTH          ALL        0          0.0

  2     NORTH/SOUTH    ALL      541         38.0

  3      EAST/ WEST    ALL      785         55.1



                     TOTALS    1326          93.1
            LEVEL OF SERVICE      E
```

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                                    H M M  ASSOCIATES

[illegible] TRAFFIC
ARLINGTON ST.    ARLINGTON ST.
COMMONWEALTH AV.    COMMONWEALTH AV.
WEEKDAY    PM PEAK    1985


                           VOLUME ALLOCATION TO LANES

TRAFFIC       LANE 1             LANE 2              LANE 3             LANE 4
 FROM      L     S     R      L     S     R      L     S     R      L     S     R
-------   -----------------  -----------------  -----------------  -----------------

 NORTH     0    409    0      0    409    0      0    409    0      0  [illegible] [illegible]
  EAST     0     0     0      0     0     0      0     0     0      0     0  [illegible]
 SOUTH     0     0     0      0     0     0      0     0     0      0     0     0
  WEST     0     0    324     0     0    395     0     0     0      0     0     0


            LEFT  TURN  CHECK

TRAFFIC       LEFT  TURN        PHASE
 FROM      CAPACITY   VOLUME    NEEDED?
-------    -----------------    -------

  EAST        80         0         N
 SOUTH        80         0         N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.51
            EAST/WEST     0.49



                                      PLANNING

PHASE      TRAFFIC      MOVE   CRITICAL      PERCENT         EFFECTIVE    AVERAGE
            FROM        MENT    VOLUME    CAPACITY USED     GREEN TIME     DELAY
-----   -----------     ----   --------   -------------    -----------   --------

  1     NORTH/SOUTH     ALL      409          27.3              43           18

  2      EAST/ WEST     ALL      395          26.3              41           17




                   TOTALS        804          53.6              84
           LEVEL OF SERVICE       A
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```
                                   H M M  ASSOCIATES

BACK BA. TRAFFIC                                                                  [illegible]
ARLINGTON ST.    ARLINGTON ST.                                                    [illegible]
BOYLSTON ST.   BOYLSTON ST.
WEEKDAY   PM PEAK    1985


                         VOLUME ALLOCATION  0 LANES

TRAFFIC       LANE 1                  LANE 2               LANE 3              LANE 4
 FROM      L     S     R         L     S     R         L     S     R        L     S     R
-------  ---------------       ---------------       ---------------      ---------------

 NORTH    352     0     0       288   309     0       0   655     0        0     0     0
  EAST      0     0     0         0     0     0       0     0     0        0     0     0
 SOUTH      0     0     0         0     0     0       0     0     0        0     0     0
  WEST      0   417     0         0   417     0       0    73   344        0     0     0


              LEFT TURN CHECK

TRAFFIC        LEFT TURN         PHASE
 FROM      CAPACITY   VOLUME     NEEDED?
-------    ----------------      -------

 NORTH        812       352         Y
  EAST         80         0         N
 SOUTH         80         0         N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH    0.61
            EAST/WEST      0.39


                                   PLANNING

PHASE     TRAFFIC      MOVE   CRITICAL      PERCENT       EFFECTIVE     AVERAGE
           FROM        MENT    VOLUME    CAPACITY USED    GREEN TIME     DELAY
-----   -----------    ----   --------   -------------    ----------    -------

  1     NORTH          ALL      352          24.7             27      [illegible]

  2     NORTH/SOUTH    ALL      303          21.3             23      [illegible]

  3      EAST/ WEST    ALL      417          29.3             32      [illegible]




                     TOTALS     1072          75.3             82
            LEVEL OF SERVICE     C
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                              H M M  ASSOCIATES

[illegible]
ARLINGTON ST.    ARLINGTON ST.
BOYLSTON ST.     BOYLSTON ST.
WEEKDAY     PM PEAK     1985


                        VOLUME ALLOCATION TO LANES

TRAFFIC        LANE 1                LANE 2               LANE 3              LANE 4
FROM       L      S      R       L      S      R       L      S      R       L      S      R
-------    ------------------    ------------------    ------------------    ------------------

NORTH     51      0      0     256    309      0       0    555      0       0      0      0
 EAST      0      0      0       0      0      0       0      0      0       0      0      0
SOUTH      0      0      0       0      0      0       0      0      0       0      0      0
 WEST      0    593      0       0    593      0       0    163    430       0      0      0


            LEFT TURN CHECK

TRAFFIC          LEFT TURN          PHASE
 FROM       CAPACITY   VOLUME      NEEDED?
-------     ------------------     -------

 NORTH         704       352          Y
  EAST          90         0          N
 SOUTH          90         0          N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.52
            EAST/WEST     0.48


                                    PLANNING

PHASE     TRAFFIC       MOVE    CRITICAL       PERCENT         EFFECTIVE     AVERAGE
           FROM         MENT     VOLUME     CAPACITY USED     GREEN TIME      DELAY
-----   -----------     ----    --------    -------------     ----------    --------

  1     NORTH            ALL       352           24.7              23            43

  2     NORTH/SOUTH      ALL       303           21.3              20            45

  3      EAST/ WEST      ALL       593           41.6              39            27



                      TOTALS      1248           87.6              82
            LEVEL OF SERVICE        D
```

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                                        [illegible] ASSOCIATES

  [illegible]
 ARLINGTON ST.     ARLINGTON ST.
 BOYLSTON ST.    BOYLSTON ST.
WEEKDAY    PM PEAK    1985



                              VOLUME ALLOCATION TO LANES

 TRAFFIC        LANE 1                 LANE 2               LANE 3
  FROM       L      T      R        L      T      R       L      T      R
 -------    --------------------   --------------------   --------------------   -------

  NORTH     352     0      0      [illegible] [illegible]  0     0  [illegible]  0      [illegible]
   EAST       0     0      0        0      0      0       0      0      0      0            0
  SOUTH       0     0      0        0      0      0       0      0      0      0      0     0
   WEST       0   446      0        0    446      0       0     16    430      0      0     0


                LEFT TURN CHECK

TRAFFIC          LEFT TURN           PHASE
 FROM         CAPACITY   VOLUME      NEEDED?
-------       ----------------      -------

 NORTH          738        352          Y
  EAST           80          0          N
 SOUTH           80          0          N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.59
            EAST/WEST     0.41



                                         PLANNING

PHASE        TRAFFIC        MOVE    CRITICAL         PERCENT           EFFECTIVE     AVERAGE
              FROM          MENT     VOLUME       CAPACITY USED       GREEN TIME     DELAY
-----     ------------      ----    --------     ---------------     ----------    -------

  1        NORTH             ALL       352            24.7                26          13

  2        NORTH/SOUTH       ALL       303            21.3                23      [illegible]

  3         EAST/ WEST       ALL       446            31.3                33      [illegible]




                       TOTALS       1101            77.3                82
             LEVEL OF SERVICE         C
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                              [illegible] ASSOCIATES

[illegible]
ARLINGTON ST.    ARLINGTON ST.
BOYLSTON ST.     BOYLSTON ST.
WEEKDAY    PM PEAK    1985


                        [illegible]

TRAFFIC     [illegible]           [illegible]            [illegible]         [illegible]
 FROM
-------   -------------------   -------------------   ------------------   ----------

NORTH     352     0     0     138  [illegible]  0      0   235  [illegible]    0     0
 EAST       0     0     0       0      0        0      0     0      0          0     0
SOUTH       0     0     0       0      0        0      0     0      0          0     0    0
 WEST       0   490     0       0    490        0      0    60    430          0     0


              LEFT TURN CHECK

TRAFFIC        LEFT TURN           PHASE
 FROM      CAPACITY    VOLUME     NEEDED?
-------    ------------------     -------

NORTH         [illegible]    352        Y
 EAST          80             0        N
SOUTH          80             0        N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.57
            EAST/WEST     0.43


                                        PLANNING

PHASE      TRAFFIC       MOVE   CRITICAL       PERCENT         EFFECTIVE    AVERAGE
            FROM         MENT    VOLUME    CAPACITY USED    GREEN TIME     DELAY
-----   ------------     ----   --------   --------------   ----------   -------

  1     NORTH             ALL      352          24.7              25       [illegible]

  2     NORTH/SOUTH       ALL      303          21.3              22           40

  3      EAST/ WEST       ALL      490          34.4              33       [illegible]




                      TOTALS      1145          30.4              92
            LEVEL OF SERVICE        D
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```
                          [illegible]

BACK BAY TRAFFIC
ARLINGTON ST.    ARLINGTON ST.
STUART ST.    STUART ST.
WEEKDAY    PM PEAK    1985



                         VOLUME ALLOCATION BY LANES

TRAFFIC        LANE 1              LANE 2              LANE 3              LANE 4
FROM        L     S     R       L     S     R       L     S     R       L     S     R
-------    ---------------     -----------------    ----------------    --------------

 NORTH     338   214    0       0   145    74       0     0     0       0     0
  EAST     349     0    0       0     0     0       0     0     0       0     0
 SOUTH       0     0    0       0     0     0       0     0     0       0     0     0
  WEST       0   430    0       0   172   258       0     0     0       0     0     0


               LEFT TURN CHECK

TRAFFIC         LEFT TURN          PHASE
 FROM      CAPACITY    VOLUME     NEEDED?
-------    ------------------     -------

 NORTH        608        338         N
  EAST         80        349         Y

CYCLE LENGTH :  90 SECONDS

G/C RATIO : NORTH/SOUTH   0.44
            EAST/WEST     0.56


                                   PLANNING

PHASE     TRAFFIC      MOVE   CRITICAL       PERCENT        EFFECTIVE    AVERAGE
           FROM        MENT    VOLUME     CAPACITY USED    GREEN TIME     DELAY
-----   -----------    ----   --------    -------------    ----------   -------

  1     NORTH/SOUTH     ALL      619           43.4

  2       EAST          ALL      349           24.5

  3       EAST/ WEST    ALL      430           30.2




                     TOTALS      1398          98.1
            LEVEL OF SERVICE       E
```

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                         H M M  ASSOCIATES

  [illegible] TRAFFIC
BERKELEY ST.    BERKELEY ST.
COLUMBUS AV.    COLUMBUS AV.
WEEKDAY    PM PEAK    1985


                    VOLUME ALLOCATION TO LANES

TRAFFIC       LANE 1              LANE 2              LANE 3             LANE 4
 FROM      L     S     R       L     S     R       L     S     R      L     S     R
-------   -----------------   -----------------   -----------------   -----------------

NORTH      0     0     0       0     0     0       0     0     0      0     0     0
 EAST      0   333     0       0   257    76       0     0     0      0     0     0
SOUTH    186   121     0       0   344     0       0   225   119      0     0     0
 WEST     74    37     0       0   333     0       0     0     0      0     0     0


            LEFT TURN CHECK

TRAFFIC         LEFT TURN          PHASE
 FROM      CAPACITY    VOLUME     NEEDED?
-------    ------------------     -------

NORTH         80          0          N
SOUTH        632        186          N
 WEST         80         74          N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.46
            EAST/WEST     0.54


                                    PLANNING

PHASE    TRAFFIC     MOVE   CRITICAL     PERCENT        EFFECTIVE     AVERAGE
          FROM       MENT    VOLUME   CAPACITY USED    GREEN TIME      DELAY
-----  -----------   ----   --------  --------------   ----------    -------

  1    NORTH/SOUTH   ALL      344          22.9            38       [illegible]

  2     EAST/ WEST   ALL      407          27.1            46       [illegible]



                 TOTALS       751          50.0            84
           LEVEL OF SERVICE    A
```

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                              H M M  ASSOCIATES

[illegible]
BERKELEY ST.    BERKELEY ST.
ST. JAMES ST.    ST. JAMES ST.
WEEKDAY   PM PEAK    1985


                    VOLUME ALLOCATION TO LANES

TRAFFIC      LANE 1            LANE 2              LANE 3            LANE 4
FROM      L     T     R      L     T     R      L     T     R      L     T     R
-------   -----------------  -----------------  -----------------  -----------------

NORTH     0     0     0      0     0     0      0     0     0      0     0
 EAST     0   388     0      0    89   299      0     0     0      0     0
SOUTH   360    32     0      0   464     0      0   383    81      0     0     0
 WEST     0     0     0      0     0     0      0     0     0      0     0     0


          LEFT TURN CHECK

TRAFFIC        LEFT TURN         PHASE
 FROM     CAPACITY   VOLUME     NEEDED?
-------   ------------------   --------

 NORTH       80         0          N
 SOUTH      728       360          N
  WEST       80         0          N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.54
            EAST/WEST     0.46


                              PLANNING

PHASE     TRAFFIC      MOVE   CRITICAL      PERCENT        EFFECTIVE    AVERAGE
           FROM        MENT    VOLUME    CAPACITY USED    GREEN TIME     DELAY
-----   -----------    ----   --------   -------------    ----------    -------

  1     NORTH/SOUTH     ALL      464          30.9             46           16

  2      EAST/ WEST     ALL      388          25.9             38           22




                 TOTALS          852          56.8             84
          LEVEL OF SERVICE        A
```

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                                        H M M  ASSOCIATES

[illegible] TRAFFIC
BERKELEY ST.    BERKELEY ST.
BOYLSTON ST.    BOYLSTON ST.
WEEKDAY    PM PEAK    1985


                               VOLUME ALLOCATION (4 LANES)

TRAFFIC         LANE 1              LANE 2              LANE 3              LANE 4
FROM        L     S     R       L     S     R       L     S     R       L     S     R
-------   -----------------   -----------------   -----------------   -----------------

NORTH       0     0     0       0     0     0       0     0     0       0     0
 EAST       0     0     0       0     0     0       0     0     0       0     0     0
SOUTH       0   524     0       0   524     0       0     0   468       0     0     0
 WEST     264   122     0       0   439     0       0   439     0       0     0     0


                LEFT  TURN  CHECK

TRAFFIC         LEFT  TURN         PHASE
 FROM       CAPACITY    VOLUME    NEEDED?
-------     ----------------      -------

 NORTH         80           0        N
  EAST         80           0        N
  WEST        632         264        Y

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH    0.54
            EAST/WEST      0.46


                                          PLANNING

PHASE      TRAFFIC       MOVE   CRITICAL      PERCENT        EFFECTIVE    AVERAGE
             FROM        MENT    VOLUME    CAPACITY USED    GREEN TIME    DELAY
-----    ------------    ----   --------   -------------    ----------   --------

  1      NORTH/SOUTH      ALL      524          36.8              45          19

  2        WEST           ALL      264          18.5              22          26

  3        EAST/ WEST     ALL      175          12.3              15           4




                       TOTALS      963          67.6              82
             LEVEL OF SERVICE       B
```

```
                              HMM  ASSOCIATES

BACK BAY TRAFFIC
BERKELEY ST.    BERKELEY ST.
BOYLSTON ST.    BOYLSTON ST.
WEEKDAY    PM PEAK    1985



                         VOLUME ALLOCATION TO LANES

TRAFFIC        LANE 1               LANE 2               LANE 3               LANE 4
 FROM       L     S     R       L     S     R       L     S     R       L     S     R
-------    ----------------    ----------------    ----------------    ----------------

 NORTH      0     0     0       0     0     0       0     0     0       0     0     0
  EAST      0     0     0       0     0     0       0     0     0       0     0     0
 SOUTH      0   250     0       0   250     0       0     0   680       0     0     0
  WEST     61   375     0       0   448     0       0   448     0       0     0     0


              LEFT TURN CHECK

TRAFFIC          LEFT TURN           PHASE
 FROM       CAPACITY    VOLUME      NEEDED?
-------     ------------------      -------

 NORTH          60          0          N
  EAST          80          0          N
  WEST         560         61          Y

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.50
            EAST/WEST     0.40



                                   PLANNING

PHASE      TRAFFIC       MOVE   CRITICAL       PERCENT        EFFECTIVE     AVERAGE
            FROM         MENT    VOLUME     CAPACITY USED    GREEN TIME      DELAY
-----    -----------     ----   --------    -------------    ----------     -------

  1      NORTH/SOUTH      ALL      680           47.7             49            19

  2        WEST           ALL       61            4.3              4           117

  3        EAST/ WEST     ALL      387           27.2             28            24




                     TOTALS       1128           79.2             81
           LEVEL OF SERVICE         C
```

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                               H M M  ASSOCIATES

BACK BAY TRAFFIC                                                          [illegible]
BERKELEY ST.    BERKELEY ST.                                              [illegible]
BOYLSTON ST.    BOYLSTON ST.
WEEKDAY    PM PEAK    1985


                       VOLUME ALLOCATION TO LANES

TRAFFIC       LANE 1              LANE 2              LANE 3              RT
 FROM      L     S     R       L     S     R       L     S     R       L     S     R
-------   -----------------   -----------------   -----------------   -----------------

 NORTH     0     0     0       0     0     0       0     0     0       0     0     0
  EAST     0     0     0       0     0     0       0     0     0       0     0     0
 SOUTH     0   501     0       0   501     0       0     0   468       0     0     0
  WEST   224   154     0       0   423     0       0   423     0       0     0     0


            LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM      CAPACITY   VOLUME     NEEDED?
-------    ------------------    -------

 NORTH         80          0         N
  EAST         80          0         N
  WEST        632        224         Y

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.54
          -  EAST/WEST     0.46


                                  PLANNING

PHASE      TRAFFIC      MOVE   CRITICAL        PERCENT         EFFECTIVE    AVERAGE
            FROM        MENT    VOLUME      CAPACITY USED     GREEN TIME     DELAY
-----   -----------     ----   --------     -------------     ----------    -------

  1      NORTH/SOUTH     ALL      501            35.2              44            19

  2       WEST           ALL      224            15.7              20            37

  3       EAST/ WEST     ALL      199            14.0              18             6




                      TOTALS      924            64.9              82
           LEVEL OF SERVICE        B
```

```
[illegible]
BERKELEY ST.     BERKELEY ST.
BOYLSTON ST.     BOYLSTON ST.
WEEKDAY    PM PEAK    1985


                         VOLUME [illegible]

[illegible]

 NORTH       0    0    0      0    0    0      0    0           0
  EAST       0    0    0      0    0    0      0    0    0      0    0    0
 SOUTH       0  444    0      0  444    0      0    0  468      0    0    0
  WEST       0  377    0      0  376    0      0  378    0      0    0    0


             LEFT TURN CHECK

TRAFFIC        LEFT TURN        PHASE
 FROM      CAPACITY   VOLUME   NEEDED?
-------    ----------------    -------

 NORTH        80          0       N
  EAST        80          0       N
  WEST       620          0       Y

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.55
          :   EAST/WEST   0.45


                                  PLANNING

PHASE    TRAFFIC     MOVE   CRITICAL      PERCENT       EFFECTIVE    AVERAGE
          FROM       MENT    VOLUME   CAPACITY USED    GREEN TIME     DELAY
-----  -----------   ----   --------  -------------    ----------   -------

  1    NORTH/SOUTH    ALL      468         32.8             45           [illegible]

  2     WEST          ALL        0          0.0

  3     EAST/ WEST    ALL      378         26.5             37           [illegible]



                    TOTALS     846         59.3             82
           LEVEL OF SERVICE     A
```

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                                        H M M  ASSOCIATES

[illegible]
BERKELEY ST.   BERKELEY ST.
COMMONWEALTH AV.   COMMONWEALTH AV.
WEEKDAY   PM PEAK   1985


                              VOLUME ALLOCATION TO LANES

TRAFFIC      LANE 1               LANE 2              LANE 3                LANE 4
 FROM     L       S       R     L       S       R     L       S       R     L       S       R
-------   -----------------    -----------------    -----------------    -----------------

 NORTH    0       0       0     0       0       0     0       0       0     0       0
  EAST    0     209       0     0     220      19     0       0       0     0       0       0
 SOUTH  221     400       0     0     555     109     0       0       0     0       0       0
  WEST    0     397       0     0     396       0     0       0       0     0       0       0


               LEFT TURN CHECK

TRAFFIC         LEFT TURN          PHASE
 FROM      CAPACITY    VOLUME     NEEDED?
-------    -----------------     -------

 NORTH         80           0        N
 SOUTH        836         221        N
  WEST         80           0        N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.63
            EAST/WEST     0.37



                                        PLANNING

PHASE      TRAFFIC       MOVE    CRITICAL       PERCENT          EFFECTIVE      AVERAGE
            FROM         MENT     VOLUME     CAPACITY USED      GREEN TIME       DELAY
-----    ------------    ----    --------    --------------    ------------    -------

  1      NORTH/SOUTH     ALL       664           44.3               53              15

  2       EAST/ WEST     ALL       397           26.5               31              30




                        TOTALS    1061           70.8               84
            LEVEL OF SERVICE        C
```

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                              H M M  ASSOCIATES

[illegible]
BERKELEY ST.   BERKELEY ST.                                           [illegible]
BEACON ST.   BEACON ST.
WEEKDAY   PM PEAK   1985


                     VOLUME ALLOCATION TO LANES

TRAFFIC      LANE 1             LANE 2             LANE 3           LANE 4
 FROM     L     T     R      L     T     R      L     T     R      L     T
-------  -----------------  -----------------  -----------------  ----------

 NORTH     0     0     0      0     0     0      0     0     0      0     0
  EAST     0   554     0      0   365   189      0     0   220      0     0
 SOUTH   184   474     0      0   694     0      0     0     0      0     0
  WEST     0     0     0      0     0     0      0     0     0      0     0


          LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM     CAPACITY   VOLUME     NEEDED?
-------   ----------------     -------

 NORTH        80          0        N
 SOUTH       752        184        N
  WEST        80          0        N

CYCLE LENGTH :  90 SECONDS

G/C RATIO : NORTH/SOUTH  0.56
            EAST/WEST    0.44


                                PLANNING

PHASE    TRAFFIC      MOVE  CRITICAL      PERCENT       EFFECTIVE   AVERAGE
          FROM        MENT   VOLUME    CAPACITY USED   GREEN TIME    DELAY
-----  -----------    ----  --------   -------------   ----------   -------

  1    NORTH/SOUTH    ALL      694          46.3            47          22

  2     EAST/ WEST    ALL      554          36.9            37          20



                  TOTALS      1248          83.2            84
         LEVEL OF SERVICE       D
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                                   [illegible]

[illegible] TRAFFIC                                                              [illegible]
BERKELEY ST.    BERKELEY ST.
BEACON ST.    BEACON ST.
WEEKDAY   PM PEAK   1985



                         VOLUME ADJUSTED FOR LANES

TRAFFIC      LANE 1              LANE 2             LANE 3             LANE 4
 FROM      L     S     R      L     S     R      L     S     R      L     S     R
-------   -----------------   -----------------   -----------------   ---------------

 NORTH      0     0     0      0     0     0      0     0     0      0     0     0
  EAST      0   617     0      0   617     0      0     0     0      0     0     0
 SOUTH    331     0     0      0     0     0      0     0     0      0     0     0
  WEST      0     0     0      0     0     0      0     0     0      0     0     0


             LEFT TURN CHECK

TRAFFIC       LEFT TURN        PHASE
 FROM     CAPACITY   VOLUME   NEEDED?
-------   ----------------   -------

 NORTH       500         0        N
 SOUTH       500       331        N
  WEST        80         0        N

CYCLE LENGTH :  90 SECONDS

G/C RATIO : NORTH SOUTH   0.35
               EAST/WEST     0.65


                                 PLANNING

PHASE      TRAFFIC       MOVE    CRITICAL       PERCENT         EFFECTIVE     AVERAGE
            FROM         MENT     VOLUME     CAPACITY USED     GREEN TIME      DELAY
-----    -----------     ----    --------    --------------    ----------    -------

  1      NORTH/SOUTH      ALL       331           22.1              29            29

  2       EAST/ WEST      ALL       617           41.1              55            12





                   TOTALS          948           63.2              84
           LEVEL OF SERVICE          B
```

```
                                      H S H  ASSOCIATES

BACK BAY TRAFFIC
BERKELEY ST.    BERKELEY ST.
BEACON ST.    BEACON ST.
WEEKDAY    PM PEAK    1985


                              VOLUME ALLOCATION TO LANES

TRAFFIC         LANE 1               LANE 2               LANE 3               LANE 4
 FROM       L      S      R       L      S      R      L      S      R       L      S      R
-------  -----------------    -----------------    -----------------    -----------------

 NORTH      0      0      0       0      0      0      0      0      0       0      0      0
  EAST      0    617      0       0    617      0      0      0      0       0      0      0
 SOUTH    331    196      0       0    592      0      0      0      0       0      0      0
  WEST      0      0      0       0      0      0      0      0      0       0      0      0


               LEFT TURN CHECK

TRAFFIC        LEFT TURN         PHASE
 FROM      CAPACITY   VOLUME    NEEDED?
-------    ----------------     -------

 NORTH        80          0        N
 SOUTH       668        331        N
  WEST        80          0        N

CYCLE LENGTH :  90 SECONDS

G/C RATIO : NORTH/SOUTH   0.49
      -     EAST/WEST     0.51


                                        PLANNING

PHASE      TRAFFIC      MOVE   CRITICAL      PERCENT          EFFECTIVE    AVERAGE
            FROM        MENT    VOLUME    CAPACITY USED      GREEN TIME     DELAY
-----   ------------    ----   --------   -------------      ----------    -------

  1      NORTH/SOUTH     ALL      592          39.5              41            25

  2      EAST/ WEST      ALL      617          41.1              43            24




                      TOTALS     1209          80.6              84
            LEVEL OF SERVICE       D
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                         [illegible] ASSOCIATES

[illegible] TRAFFIC                                             [illegible]
BERKELEY ST.   BERKELEY ST.                                     [illegible]
BEACON ST.   BEACON ST.
WEEKDAY    PM PEAK   1985


                 VOLUME [illegible]

TRAFFIC      LANE 1           LANE 2           LANE 3          [illegible]
 FROM     L     S     R     L     S     R     L     S     R     L
-------   ---------------   ---------------   ---------------   -----------

 NORTH     0     0     0     0     0     0     0     0     0     0
  EAST     0   692     0     0   374   313     0     0   388     0
 SOUTH    37   489     0     0   533     0     0     0     0     0     0
  WEST     0     0     0     0     0     0     0     0     0     0     0


          LEFT TURN CHECK

TRAFFIC       LEFT TURN        PHASE
 FROM     CAPACITY   VOLUME   NEEDED?
-------   ----------------   -------

 NORTH       80         0        N
 SOUTH      608        37        N
  WEST       80         0        N

CYCLE LENGTH :  90 SECONDS

G/C RATIO : NORTH/SOUTH   0.44
          . EAST/WEST     0.56


                                 PLANNING

PHASE     TRAFFIC      MOVE   CRITICAL      PERCENT        EFFECTIVE    AVERAGE
           FROM        MENT    VOLUME    CAPACITY USED    GREEN TIME     DELAY
-----   -----------    ----   --------   -------------    ----------   -------

  1     NORTH/SOUTH    ALL     . 533         35.5             37       [illegible]

  2      EAST/ WEST    ALL       692         46.1             47       [illegible]




                    TOTALS    1225          81.6             84
           LEVEL OF SERVICE     D
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                              H M M ASSOCIATES

[illegible]
CLARENDON ST.   CLARENDON ST.                                              [illegible]
BEACON ST.    BEACON ST.
WEEKDAY    PM PEAK    1985


                        VOLUME ALLOCATION TO LANES

TRAFFIC       LANE 1                LANE 2                LANE 3                LANE 4
 FROM      L     S     R        L     S     R        L     S     R        L     S     R
-------   -----------------   -----------------   -----------------   -----------------

 NORTH     0   172     0        0    78    94        0     0     0        0     0     0
  EAST   321    24     0        0   410     0        0   410     0        0     0     0
 SOUTH     0     0     0        0     0     0        0     0     0        0     0     0
  WEST     0     0     0        0     0     0        0     0     0        0     0     0


            LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM      CAPACITY   VOLUME     NEEDED?
-------    ---------------      -------

  EAST        920        321          N
 SOUTH         97          0          N
  WEST         80          0          N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.30
            EAST/WEST     0.70


                                  PLANNING

PHASE      TRAFFIC       MOVE   CRITICAL      PERCENT        EFFECTIVE    AVERAGE
            FROM         MENT    VOLUME    CAPACITY USED     GREEN TIME    DELAY
-----   -----------     ----   --------   -------------     ----------   -------

  1     NORTH/SOUTH      ALL      172          11.5              25          18

  2      EAST/ WEST      ALL      410          27.3              59           8



                     TOTALS       582          38.8              84
            LEVEL OF SERVICE       A
```

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                                   H M M  ASSOCIATES

[illegible]
CLARENDON ST.   CLARENDON ST.
COMMONWEALTH AV.   COMMONWEALTH AV.
WEEKDAY   PM PEAK   1985


                          VOLUME ALLOCATION TO LANES

TRAFFIC        LANE 1              LANE 2              LANE 3              LANE 4
 FROM       L     S     R       L     S     R       L     S     R       L     S     R
-------    ---------------     ---------------     ---------------     ---------------

 NORTH     81   310     0       0   313    91       0     0     0       0     0     0
  EAST      0   274     0       0   373     0       0     0     0       0     0     0
 SOUTH      0     0     0       0     0     0       0     0     0       0     0     0
  WEST      0   463     0       0   277   186       0     0     0       0     0     0


             LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM     CAPACITY    VOLUME     NEEDED?
-------   ----------------     -------

 NORTH       644        81          N
  EAST        80         0          N
 SOUTH        80         0          N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.47
            EAST/WEST     0.53


                                  PLANNING

PHASE     TRAFFIC      MOVE   CRITICAL     PERCENT        EFFECTIVE    AVERAGE
           FROM        MENT    VOLUME   CAPACITY USED    GREEN TIME    DELAY
-----   -----------    ----   --------  -------------    ----------   -------

  1     NORTH/SOUTH    ALL      406         27.1             39          21

  2      EAST/ WEST    ALL      463         30.9             45          17




                      TOTALS    869         58.0             84
           LEVEL OF SERVICE      A
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                                        H M M  ASSOCIATES

[illegible]                                                                              [illegible]
CLARENDON ST.    CLARENDON ST.                                                           [illegible]
BOYLSTON ST.    BOYLSTON ST.
WEEKDAY    PM PEAK    1985


                              VOLUME ALLOCATION TO LANES

TRAFFIC        LANE 1                  LANE 2                  LANE 3                  LANE 4
 FROM      L      S      R         L      S      R         L      S      R         L      S      R
-------   --------------------    -----------------    -----------------    -----------------

 NORTH    187    281     0         0    511     0         0      0      0         0      0      0
  EAST      0      0     0         0      0     0         0      0      0         0      0      0
 SOUTH      0      0     0         0      0     0         0      0      0         0      0      0
  WEST      0    450     0         0    450     0         0    205    245         0      0      0


               LEFT TURN CHECK

TRAFFIC          LEFT TURN          PHASE
 FROM      CAPACITY    VOLUME      NEEDED?
-------   -----------------       -------

 NORTH        716         187          Y
  EAST         80           0          N
 SOUTH         80           0          N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.53
            EAST/WEST     0.47


                                         PLANNING

PHASE      TRAFFIC       MOVE    CRITICAL        PERCENT          EFFECTIVE     AVERAGE
            FROM         MENT     VOLUME      CAPACITY USED      GREEN TIME      DELAY
-----   ------------     ----   --------     ---------------    -----------    --------

  1     NORTH            ALL        187            13.1              16            42

  2     NORTH/SOUTH      ALL        324            22.7              28            30

  3      EAST/ WEST      ALL        450            31.6              38            23




                       TOTALS       961            67.4              82
           LEVEL OF SERVICE          B
```

```
                              [illegible]

BACK BAY TRAFFIC                                                  [illegible]
CLARENDON ST.    CLARENDON ST.
ST. JAMES AV.    ST. JAMES AV.
WEEKDAY    PM PEAK    1985


                         VOLUME ALLOCATION TO LANES

TRAFFIC       LANE 1              LANE 2              LANE 3              LANE 4
 FROM      L     S     R       L     S     R       L     S     R       L     S     R
-------  -----------------   -----------------   -----------------   -----------------

 NORTH      0   527     0       0   230   297       0     0     0       0     0     0
  EAST    145   239     0       0   432     0       0     0     0       0     0     0
 SOUTH      0     0     0       0     0     0       0     0     0       0     0     0
  WEST      0     0     0       0     0     0       0     0     0       0     0     0


             LEFT TURN CHECK

TRAFFIC        LEFT TURN           PHASE
 FROM      CAPACITY    VOLUME     NEEDED?
-------    ----------------      -------

  EAST        620        145         N
 SOUTH         80          0         N
  WEST         80          0         N

CYCLE LENGTH :   90 SECONDS

G/C RATIO :  NORTH/SOUTH   0.55
             EAST/WEST     0.45



                                        PLANNING

PHASE     TRAFFIC       MOVE    CRITICAL      PERCENT        EFFECTIVE    AVERAGE
           FROM         MENT     VOLUME    CAPACITY USED    GREEN TIME     DELAY
-----   -----------     ----    --------   -------------    ----------    -------

  1     NORTH/SOUTH     ALL       527          35.1              46           18

  2      EAST/ WEST     ALL       432          28.8              38           22




                      TOTALS      959          63.9              84
              LEVEL OF SERVICE     B
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                                        H H M  ASSOCIATES

BACK BAY TRAFFIC
CLARENDON ST.   CLARENDON ST.
COLUMBUS AV.    COLUMBUS AV.
WEEKDAY   PM PEAK    1985


                              VOLUME ALLOCATION TO LANES

TRAFFIC       LANE 1              LANE 2              LANE 3              LANE 4
 FROM      L     S     R       L     S     R       L     S     R       L     S     R
--------  -----------------   --------------   ----------------   ----------------

 NORTH    303   261    0       0   410   215      0     0     0       0     0     0
  EAST      0   303    0       0   303     0      0     0     0       0     0     0
 SOUTH      0     0    0       0     0     0      0     0     0       0     0     0
  WEST      0   215    0       0   175    40      0     0     0       0     0     0


              LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM      CAPACITY   VOLUME     NEEDED?
--------   ----------------     -------

 NORTH       884  .      303         N
 SOUTH        80           0         N

CYCLE LENGTH :  90 SECONDS

G/C RATIO : NORTH/SOUTH  0.67
            EAST/WEST    0.33


                                        PLANNING

PHASE     TRAFFIC      MOVE   CRITICAL      PERCENT       EFFECTIVE     AVERAGE
            FROM       MENT    VOLUME    CAPACITY USED   GREEN TIME      DELAY
-----   -----------    ----   --------   -------------   ----------   --------

  1     NORTH/SOUTH    ALL       625          41.7           57            11

  2      EAST/ WEST    ALL       303          20.2           27            21




                    TOTALS       928          61.9           84
             LEVEL OF SERVICE     B
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                               [illegible] M  ASSOCIATES

BACK BAY TRAFFIC                                                              [illegible]
DARTMOUTH ST.    DARTMOUTH ST.                                                [illegible]
COLUMBUS AV.    COLUMBUS AV.
WEEKDAY    PM PEAK    1985


                        VOLUME ALLOCATION TO LANES

TRAFFIC         LANE 1               LANE 2               LANE 3               LANE 4
 FROM       L     S     R        L     S     R        L     S     R        L     S     R
-------   ------------------   ------------------   ------------------   ------------------

 NORTH     54   220     0        0   143   141        0     0     0        0     0     0
  EAST     75   276     0        0   371    55        0     0     0        0     0     0
 SOUTH     56    86     0        0   166    32        0     0     0        0     0     0
  WEST     82    30     0        0   358     0        0     0   135        0     0     0


              LEFT TURN CHECK

TRAFFIC        LEFT TURN         PHASE
 FROM      CAPACITY   VOLUME    NEEDED?
-------    ----------------    -------

 NORTH        276        54        N
  EAST        277        75        N
 SOUTH         80        56        N
  WEST         98        82        N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.40
            EAST/WEST     0.60


                                 PLANNING

PHASE      TRAFFIC      MOVE   CRITICAL      PERCENT         EFFECTIVE    AVERAGE
            FROM        MENT    VOLUME    CAPACITY USED     GREEN TIME    DELAY
-----   -----------     ----   --------   -------------     ----------    -------

  1     NORTH/SOUTH      ALL      340          22.7             34           11

  2      EAST/ WEST      ALL      508          33.9             50           14





                     TOTALS       848          56.6             84
           LEVEL OF SERVICE        A
```

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                              H M M   ASSOCIATES

BACK BAY TRAFFIC                                                      [illegible]
DARTMOUTH ST.    DARTMOUTH ST.                                        [illegible] 11/85
STUART ST.    STUART ST.
WEEKDAY    PM PEAK    1985


                         VOLUME ALLOCATION TO LANES

TRAFFIC        LANE 1               LANE 2              LANE 3              LANE 4
 FROM      L      S      R      L      S      R      L      S      R      L      S      R
-------   --------------------   -------------------   -------------------   -------------------

 NORTH     0      0      0      0      0      0      0      0      0      0      0      0
  EAST     0      0      0      0      0      0      0      0      0      0      0      0
 SOUTH     0    180      0      0    180      0      0     95     85      0      0      0
  WEST   430      0      0      0    457      0      0    227    230      0      0    282


            LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM      CAPACITY   VOLUME     NEEDED?
-------    ----------------      -------

 NORTH         80         0         Y
  EAST         80         0         N
  WEST        944       430         N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.28
            EAST/WEST     0.72


                                   PLANNING

PHASE      TRAFFIC        MOVE   CRITICAL       PERCENT         EFFECTIVE    AVERAGE
            FROM          MENT    VOLUME    CAPACITY USED     GREEN TIME     DELAY
-----    -----------      ----   --------   -------------     ----------    -------

  1      NORTH             ALL        0          0.0

  2      NORTH/SOUTH       ALL      180         12.6              23            30

  3       EAST/ WEST  .    ALL      457         32.1              59             8



                  TOTALS            637         44.7              82
           LEVEL OF SERVICE          A
```

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                          HMM ASSOCIATES

BACK BAY TRAFFIC                                                      [illegible]
DARTMOUTH ST.    DARTMOUTH ST.                                        [illegible]
ST. JAMES AV.    BLAGDEN ST.
WEEKDAY    PM PEAK    1985


                      VOLUME ALLOCATION TO LANES

TRAFFIC       LANE 1            LANE 2            LANE 3           LANE 4
FROM       L     S     R     L     S     R     L     S     R     L     S     R
-------   ---------------   ---------------   ---------------   -----

 NORTH     0     0    60     0     0    98     0     0     0     0     0    98
  EAST     0   555     0     0   555     0     0     0     0     0     0     0
 SOUTH   359     0     0     0     0     0     0     0     0     0     0     0
  WEST     0     0     0     0     0     0     0     0     0     0     0     0


            LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM      CAPACITY   VOLUME     NEEDED?
-------    ----------------      -------

 SOUTH        442        359        Y
  WEST         80          0        Y

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.45
            EAST/WEST     0.55


                                   PLANNING

PHASE     TRAFFIC       MOVE    CRITICAL       PERCENT          EFFECTIVE      AVERAGE
           FROM         MENT     VOLUME    CAPACITY USED      GREEN TIME      DELAY
-----   -----------     ----    --------   ---------------    ----------     --------

  1     SOUTH            ALL       359          25.1              28             11

  2     NORTH/SOUTH      ALL        98           7.1               8              5

  3      WEST            ALL         0           0.0

  4      EAST/ WEST      ALL       555          40.4              44             20



                     TOTALS       1012          73.6              80
          LEVEL OF SERVICE          C
```

```
                           H M M  ASSOCIATES

  [illegible] TRAFFIC                                                [illegible]
DARTMOUTH ST.    DARTMOUTH ST.
BOYLSTON ST.    BOYLSTON ST.
WEEKDAY   PM PEAK    1985


                      VOLUME ALLOCATION TO LANES

TRAFFIC       LANE 1               LANE 2               LANE 3             LANE 4
 FROM      L     S     R        L     S     R        L     S     R       L     S
-------  -----------------   ------------------   ------------------   -----------

 NORTH     0     0     0        0     0     0        0     0     0       0     0
  EAST     0     0     0        0     0     0        0     0     0       0     0
 SOUTH     0   343     0        0   343     0        0     0   421       0     0
  WEST   307    96     0        0   454     0        0   296   168       0     0     0


            LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM      CAPACITY   VOLUME     NEEDED?
-------    ----------------     -------

 NORTH        80          0          N
  EAST        80          0          N
  WEST       704        307          Y

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.48
            EAST/WEST     0.52



                              PLANNING

PHASE      TRAFFIC      MOVE   CRITICAL      PERCENT        EFFECTIVE    AVERAGE
            FROM        MENT    VOLUME    CAPACITY USED     GREEN TIME     DELAY
-----   ------------    ----   --------   -------------     ----------   --------

  1     NORTH/SOUTH     ALL       421          29.5             39      [illegible]

  2      WEST           ALL       307          21.5             28      [illegible]

  3      EAST/ WEST     ALL       157          11.0             15           41




                     TOTALS       885          62.0             82
           LEVEL OF SERVICE        B
```

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                                   H M M  ASSOCIATES

[illegible]                                                                          1
DARTMOUTH ST.    DARTMOUTH ST
COMMONWEALTH AV.    COMMONWEALTH AV.
WEEKDAY    PM PEAK    1985


                         VOLUME ALLOCATED TO LANES

TRAFFIC        LANE 1               LANE 2              LANE 3             LANE 4
 FROM      L     T     R        L     T     R        L     T     R       L     T     R
-------   -----------------    ----------------     -----------------    ---------------

 NORTH     0     0     0        0     0     0        0     0     0       0     0     0
  EAST     0   377     0        0   336    41        0     0     0       0     0     0
 SOUTH   281    67     0        0   299   124        0     0     0       0     0     0
  WEST     0   306     0        0   305     0        0     0     0       0     0     0


             LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM      CAPACITY   VOLUME     NEEDED?
-------    -----------------    -------

 NORTH        206          0        N
 SOUTH        716        281        N
  WEST         90          0        N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.53
            EAST/WEST     0.47



                                  PLANNING

PHASE     TRAFFIC      MOVE   CRITICAL      PERCENT          EFFECTIVE    AVERAGE
           FROM        MENT    VOLUME    CAPACITY USED      GREEN TIME     DELAY
-----   -----------    ----   --------   --------------    -----------   -------

  1     NORTH/SOUTH    ALL      423          28.2              44           17

  2      EAST/ WEST    ALL      377          25.1              40           20




                    TOTALS      800          53.3              84
           LEVEL OF SERVICE      A
```

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                                        H N M  ASSOCIATES

[illegible]  TRAFFIC
MASSACHUSETTS AV.   MASSACHUSETTS AV.
BEACON ST.    BEACON ST.
WEEKDAY    PM PEAK    1985


                              VOLUME ALLOCATION TO LANES

TRAFFIC       LANE 1                  LANE 2                  LANE 3                  LANE 4
 FROM      L     S     R          L     S     R          L     S     R          L     S     R
-------   -----------------      -----------------      -----------------      -----------------

 NORTH      0   622     0          0   376   276          0     0     0          0     0     0
  EAST    127   210     0          0   363     0          0    21   342          0     0     0
 SOUTH    132    97     0          0   889     0          0     0     0          0     0     0
  WEST      0     0     0          0     0     0          0     0     0          0     0     0


                LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM      CAPACITY    VOLUME     NEEDED?
-------    ----------------      -------

  EAST        428        127         N
 SOUTH         80        132         Y
  WEST         80          0         N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH    0.71
            EAST/WEST      0.29


                                          PLANNING

PHASE      TRAFFIC        MOVE   CRITICAL       PERCENT          EFFECTIVE      AVERAGE
            FROM          MENT    VOLUME     CAPACITY USED      GREEN TIME       DELAY
-----    -----------      ----   --------    --------------     ----------      -------

  1      SOUTH            ALL       132             9.3               9          [illegible]

  2      NORTH/SOUTH      ALL       757            53.1              50              21

  3       EAST/ WEST      ALL       363            25.5              24              12



                       TOTALS      1252            87.9              83
             LEVEL OF SERVICE        D
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                          H M M  ASSOCIATES

BACK BAY TRAFFIC                                                  EXNNPM
MASSACHUSETTS AV.    MASSACHUSETTS AV.                            06/12/85
NEWBURY ST.    NEWBURY ST.
WEEKDAY    PM PEAK    1985


                    VOLUME ALLOCATION TO LANES

TRAFFIC      LANE 1              LANE 2              LANE 3              LANE 4
 FROM      L    S    R        L    S    R        L    S    R        L    S    R
-------  --------------     --------------     --------------     --------------

 NORTH     0  687    0        0  427  260        0    0    0        0    0    0
  EAST   385    0    0        0    0  180        0    0    0        0    0    0
 SOUTH   121   28    0        0  753    0        0    0    0        0    0    0
  WEST     0    0    0        0    0    0        0    0    0        0    0    0


           LEFT TURN CHECK

TRAFFIC      LEFT TURN        PHASE
 FROM     CAPACITY   VOLUME   NEEDED?
-------   ----------------   -------

  EAST       464       385       N
 SOUTH        80       121       N
  WEST       284         0       Y

CYCLE LENGTH :   90 SECONDS
G/C RATIO :  NORTH/SOUTH   0.68
             EAST/WEST     0.32          PLANNING
PHASE     TRAFFIC       MOVE   CRITICAL      PERCENT        EFFECTIVE    AVERAGE
           FROM         MENT    VOLUME    CAPACITY USED    GREEN TIME     DELAY
-----   -----------     ----   --------   -------------    ----------   -------

  1     NORTH/SOUTH      ALL      808          56.7            56            16

  2      WEST            ALL        0           0.0

  3      EAST/ WEST      ALL      385          27.0            26            39




                     TOTALS      1193          83.7            82
           LEVEL OF SERVICE         D
```

```
BACK BAY TRAFFIC                                                        EXB3MPM
MASSACHUSETTS AV.   MASSACHUSETTS AV.                                   0:231 MB
BOYLSTON ST.   BOYLSTON ST.
WEEKDAY   PM PEAK   1985


                         VOLUME ALLOCATION TO LANES

TRAFFIC       LANE 1            LANE 2            LANE 3            LANE 4
 FROM      L    S    R       L    S    R       L    S    R       L    S    R
-------  ---------------   ---------------   ---------------   ---------------

 NORTH    286    0    0       0  815    0       0    0   55       0    0
  EAST      0  110    0       0    9  101       0    0    0       0    0    0
 SOUTH      0  292    0       0  292    0       0  157  135       0    0    0
  WEST      0  346    0       0  210  136       0    0    0       0    0    0


              LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM      CAPACITY   VOLUME     NEEDED?
-------    ------------------    -------

 NORTH         80        286         Y

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.70
            EAST/WEST     0.30


                                  PLANNING

PHASE      TRAFFIC       MOVE   CRITICAL      PERCENT       EFFECTIVE    AVERAGE
            FROM         MENT    VOLUME    CAPACITY USED    GREEN TIME    DELAY
-----   -----------      ----   --------   -------------   ----------   -------

  1     NORTH             ALL      286          20.1            20           43

  2     NORTH/SOUTH       ALL      529          37.1            37           28

  3      EAST/ WEST       ALL      346          24.3            24           39



                       TOTALS     1161          81.5            81
              LEVEL OF SERVICE      D
```

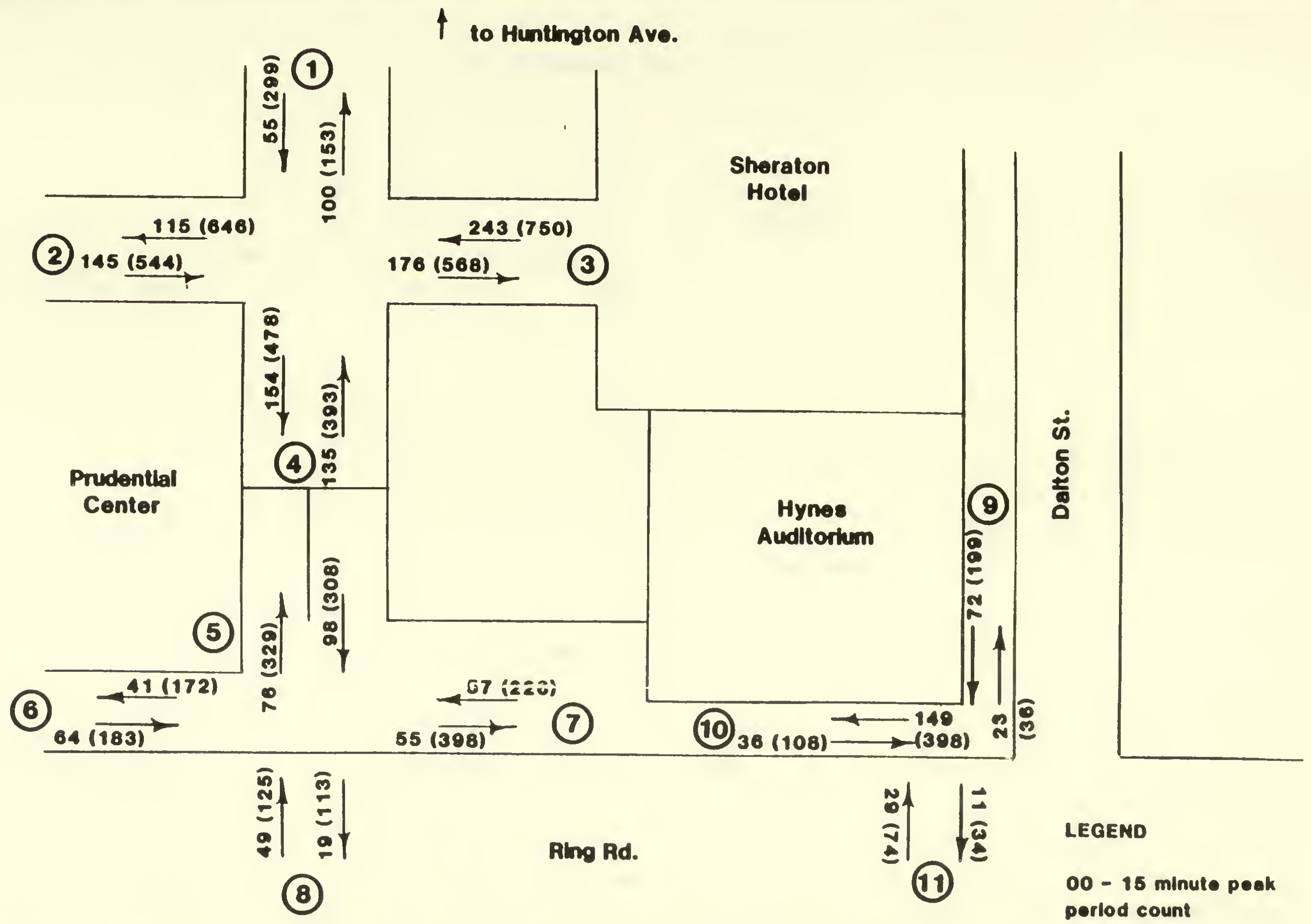
```
                                 H M-M  ASSOCIATES

BACK BAY TRAFFIC                                                        EXHIWNPM
BELVIDERE ST.    W. NEWTON ST.                                          02221 MB
HUNTINGTON AV.   HUNTINGTON AV.
WEEKDAY   PM PEAK    1985


                       VOLUME ALLOCATION TO LANES

TRAFFIC      LANE 1             LANE 2             LANE 3             LANE 4
 FROM      L    S    R        L    S    R        L    S    R        L    S    R
-------  ---------------    ---------------    ---------------    ---------------

 NORTH    155    0    0       0  243    0        0    0  124        0    0    0
  EAST      0  675    0       0  579   96        0    0    0        0    0    0
 SOUTH     41  146   69       0    0    0        0    0    0        0    0    0
  WEST      0  325    0       0  271   54        0    0    0        0    0    0


            LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM      CAPACITY   VOLUME     NEEDED?
-------    ----------------      -------

 NORTH        285        155        Y
 SOUTH        133         41        N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.35
            EAST/WEST     0.65


                                  PLANNING

PHASE      TRAFFIC      MOVE   CRITICAL     PERCENT        EFFECTIVE    AVERAGE
            FROM        MENT    VOLUME   CAPACITY USED    GREEN TIME     DELAY
-----   -----------     ----   --------  -------------    ----------   -------

  1     NORTH            ALL      155         10.9            12            50

  2     NORTH/SOUTH      ALL      215         15.1            17            42

  3      EAST/ WEST      ALL      675         47.4            53            15




                   TOTALS        1045         73.4            82
          LEVEL OF SERVICE         C
```

```
                              H M M  ASSOCIATES

BACK BAY TRAFFIC                                                      EXISBPM
MASSACHUSETTS AV.    MASSACHUSETTS AV.                                06/12/85
ST. BOTOLPH ST.    ST. BOTOLPH ST.
WEEKDAY    PM PEAK    1985


                          VOLUME ALLOCATION TO LANES

TRAFFIC       LANE  1               LANE  2              LANE  3              LANE  4
 FROM      L     S     R         L     S     R        L     S     R        L     S     P
-------   ---------------       ---------------      ---------------      ---------------

 NORTH     0     0     0         0   583     0        0   537    46        0     0     0
  EAST    95    28    36         0     0     0        0     0     0        0     0     0
 SOUTH   105     0     0         0   536     0        0   446    90        0     0     0
  WEST    30    26   149         0     0     0        0     0     0        0     0     0


             LEFT TURN CHECK

TRAFFIC        LEFT TURN          PHASE
 FROM      CAPACITY   VOLUME     NEEDED?
-------    ------------------    -------

 NORTH        80          0         N
  EAST       241         95         N
 SOUTH        80        105         Y
  WEST       352         30         N

CYCLE LENGTH :   90 SECONDS

G/C RATIO : NORTH/SOUTH   0.72
            EAST/WEST     0.28

                                       PLANNING
PHASE      TRAFFIC        MOVE      CRITICAL      PERCENT          EFFECTIVE     AVERAGE
            FROM          MENT       VOLUME    CAPACITY USED       GREEN TIME     DELAY
-----   -----------       ----      --------   -------------       ----------    -------
  1     SOUTH              ALL        105            7.4                9            52

  2     NORTH/SOUTH        ALL        583           40.9               50            16

  3      EAST/ WEST        ALL        270           18.9               23            35




                       TOTALS         958           67.2               82
             LEVEL OF SERVICE          B
```

```
                                H M M  ASSOCIATES

BACK BAY TRAFFIC                                                        EXHMPM
MASSACHUSETTS AV.    MASSACHUSETTS AV.                                  06/12/85
HUNTINGTON AV.    HUNTINGTON AV.
WEEKDAY     PM PEAK     1985


                        VOLUME ALLOCATION TO LANES

TRAFFIC         LANE 1               LANE 2               LANE 3               LANE 4
 FROM       L     S     R        L     S     R        L     S     R        L     S     R
-------   ---------------      ---------------      ---------------      ---------------

 NORTH      0   680     0        0   555   125        0     0     0        0     0     0
  EAST    113     0     0        0    45   145        0     0     0        0     0     0
 SOUTH      0   617     0        0   572    45        0     0     0        0     0     0
  WEST    124     0     0        0    19    65        0     0     0        0     0     0


            LEFT TURN CHECK

TRAFFIC         LEFT TURN          PHASE
 FROM      CAPACITY    VOLUME     NEEDED?
-------    ----------------      -------

  EAST        380        113         Y
  WEST        274        124         N

CYCLE LENGTH :   90 SECONDS

G/C RATIO :  NORTH/SOUTH   0.68
             EAST/WEST     0.32


                                 PLANNING

PHASE      TRAFFIC      MOVE    CRITICAL       PERCENT        EFFECTIVE    AVERAGE
            FROM        MENT     VOLUME     CAPACITY USED     GREEN TIME    DELAY
-----    -----------    ----    --------    -------------     ----------   -------

  1      NORTH/SOUTH     ALL       680           47.7              61            9

  2        EAST          ALL       113            7.9              10           49

  3        EAST/ WEST    ALL       124            8.7              11           47




                  TOTALS           917           64.3              82
           LEVEL OF SERVICE         B
```

APPENDIX 5

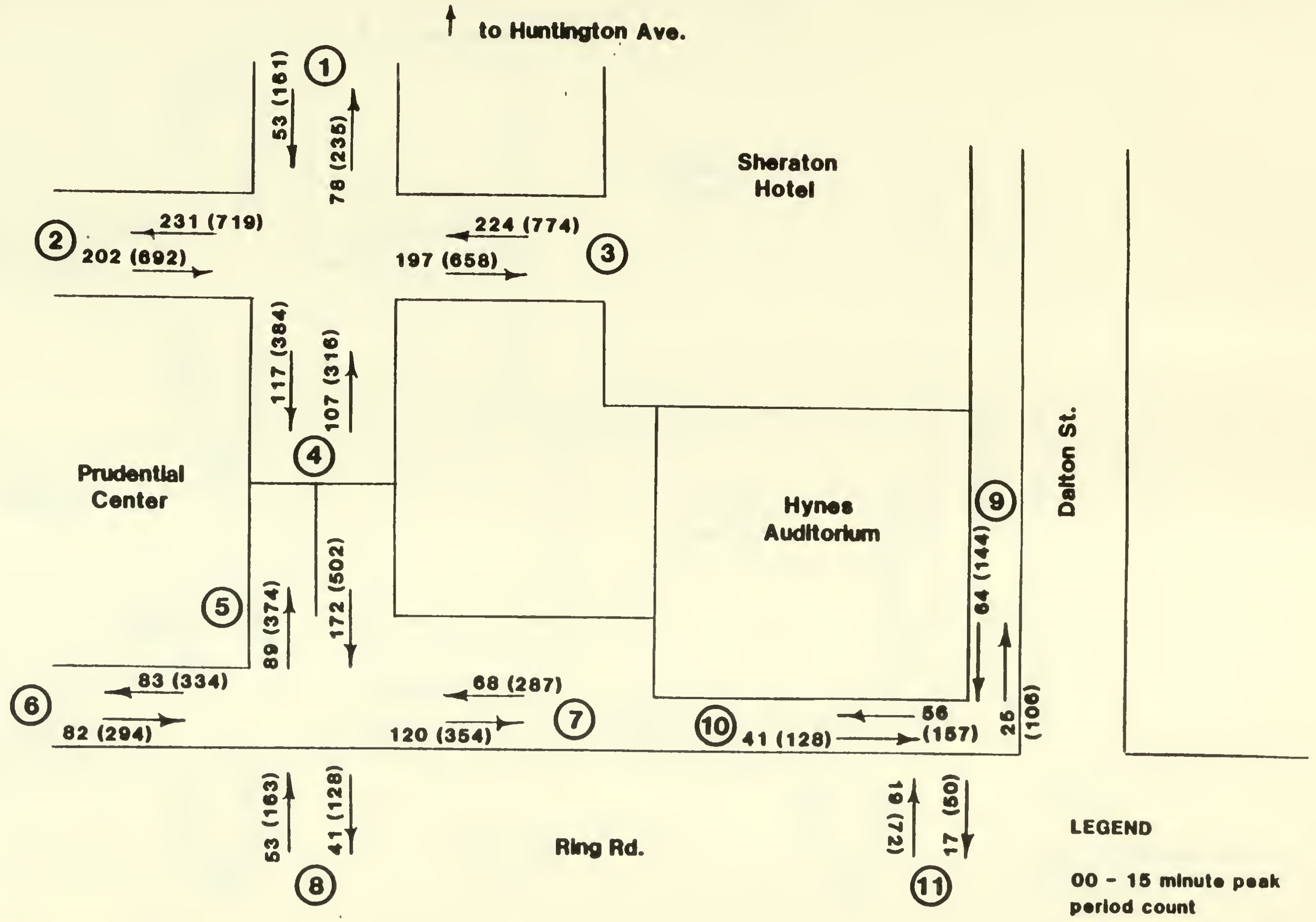
HYNES AUDITORIUM PEDESTRIAN COUNTS



SOURCE: HMM PEDESTRIAN COUNTS

NOTE: Pedestrian flows represent peak, directional midblock counts.

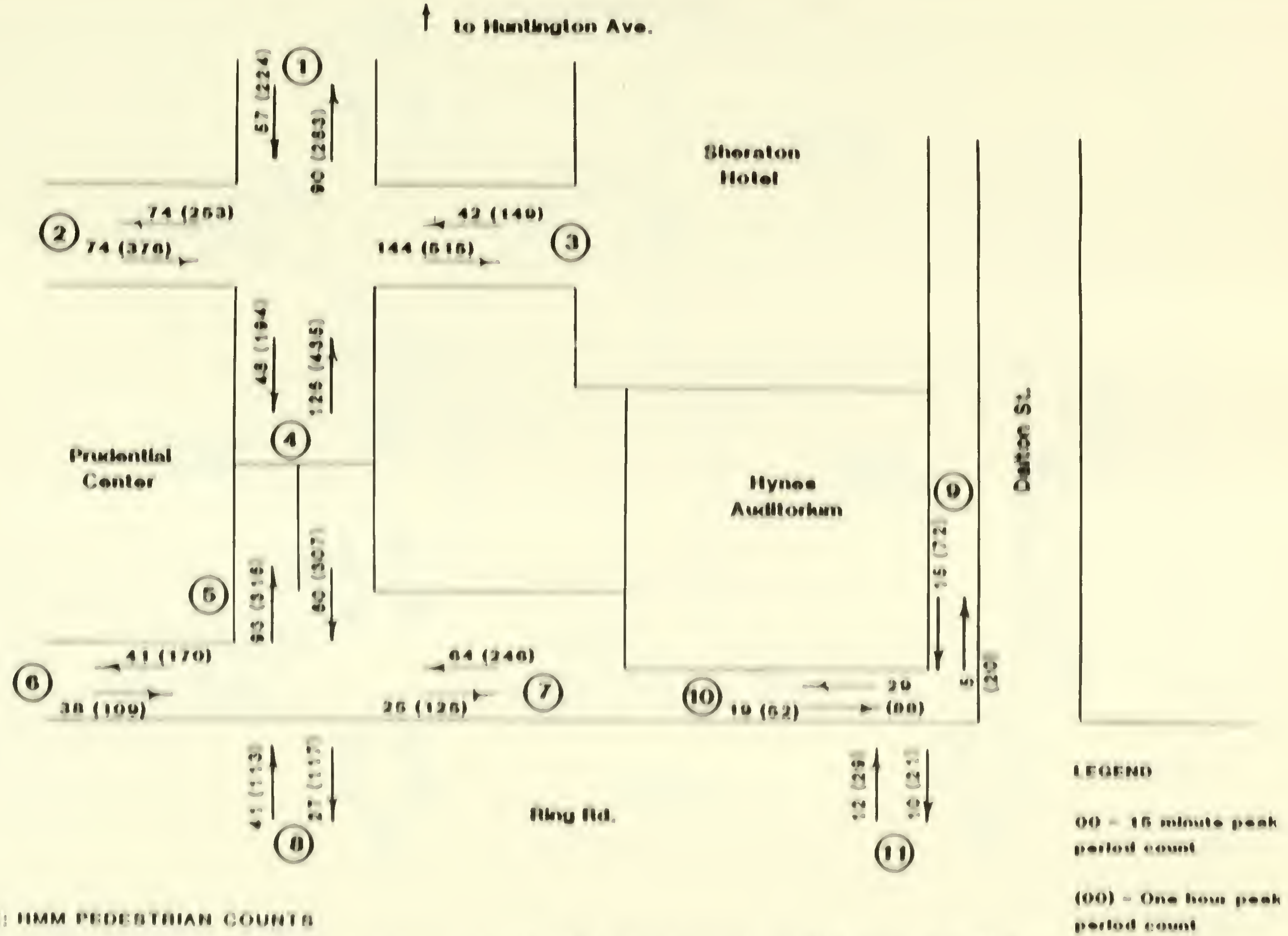
Shriners' Convention Week: A.M. Peak 15 Minute and One Hour Pedestrian Volumes



SOURCE: HMM PEDESTRIAN COUNTS

NOTE: Pedestrian flows represent peak, directional midblock counts.

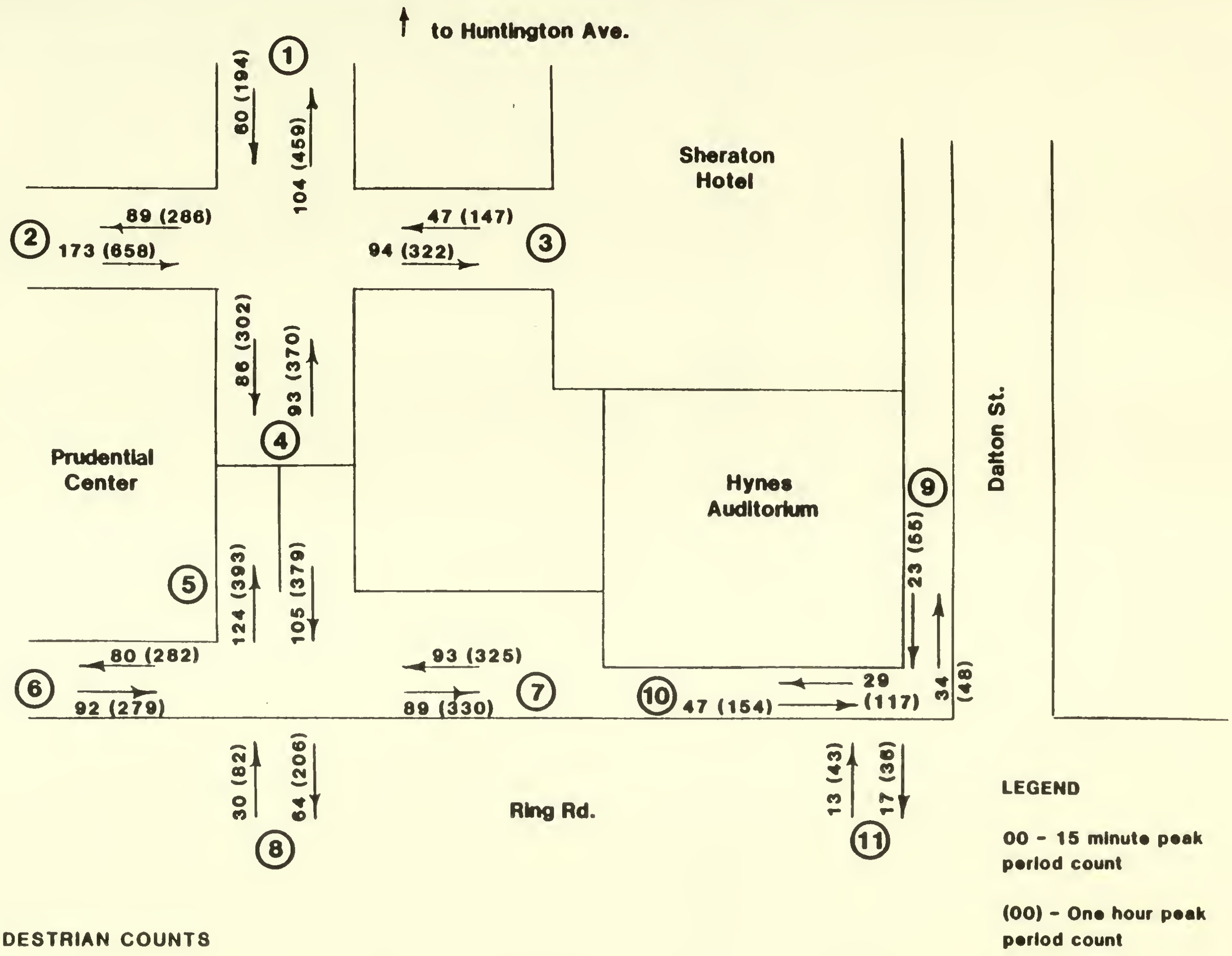
Shriners' Convention Week: P.M. Peak 15 Minute and One Hour Pedestrian Volumes



SOURCE: HMM PEDESTRIAN COUNTS

NOTE: Pedestrian flows represent peak, directional midblock counts.

Non-Convention Week: A.M. Peak 15 Minute and One Hour Pedestrian Volumes



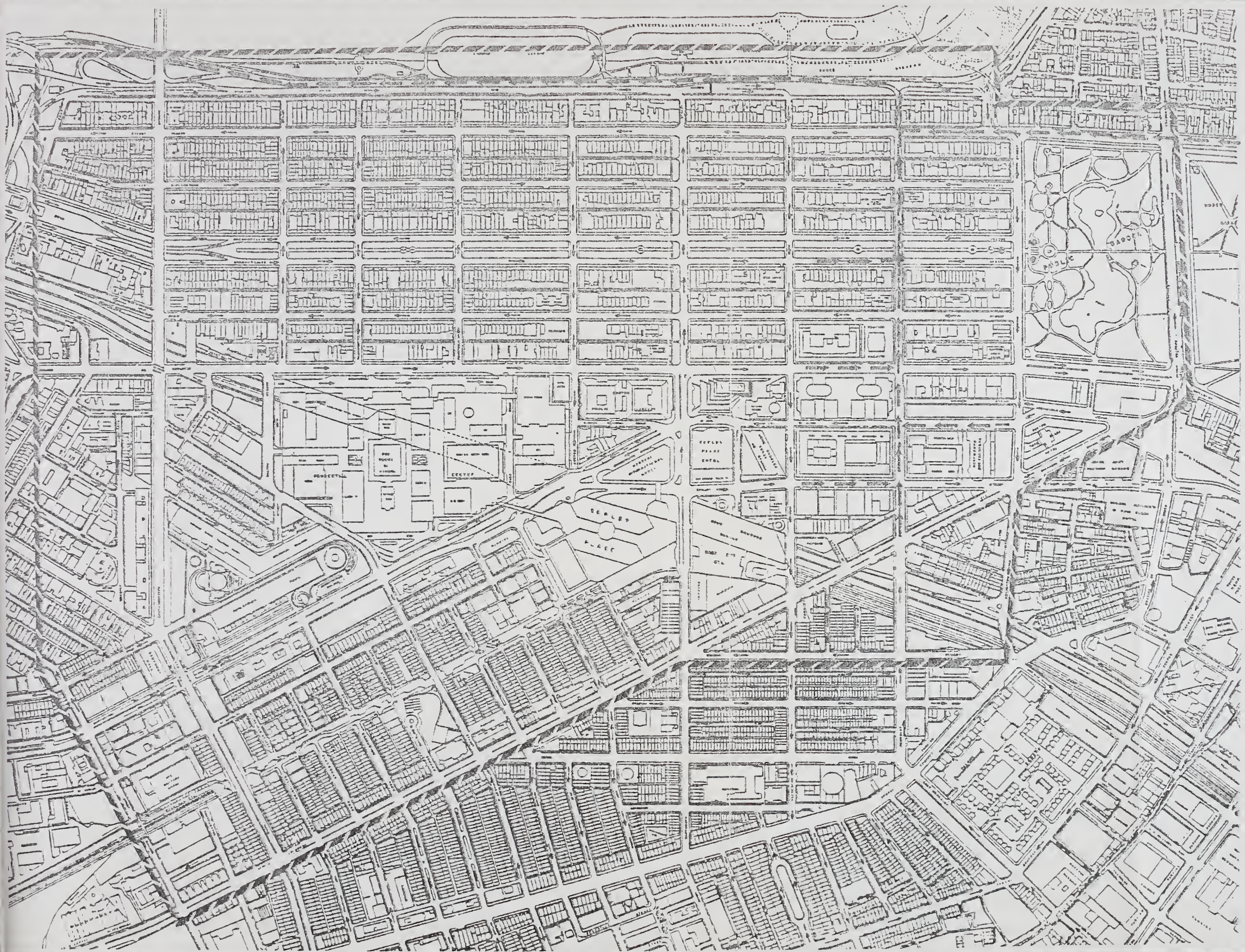
SOURCE: HMM PEDESTRIAN COUNTS

NOTE: Pedestrian flows represent peak, directional midblock counts.

Non-Convention Week: P.M. Peak 15 Minute and One Hour Pedestrian Volumes

APPENDIX 6

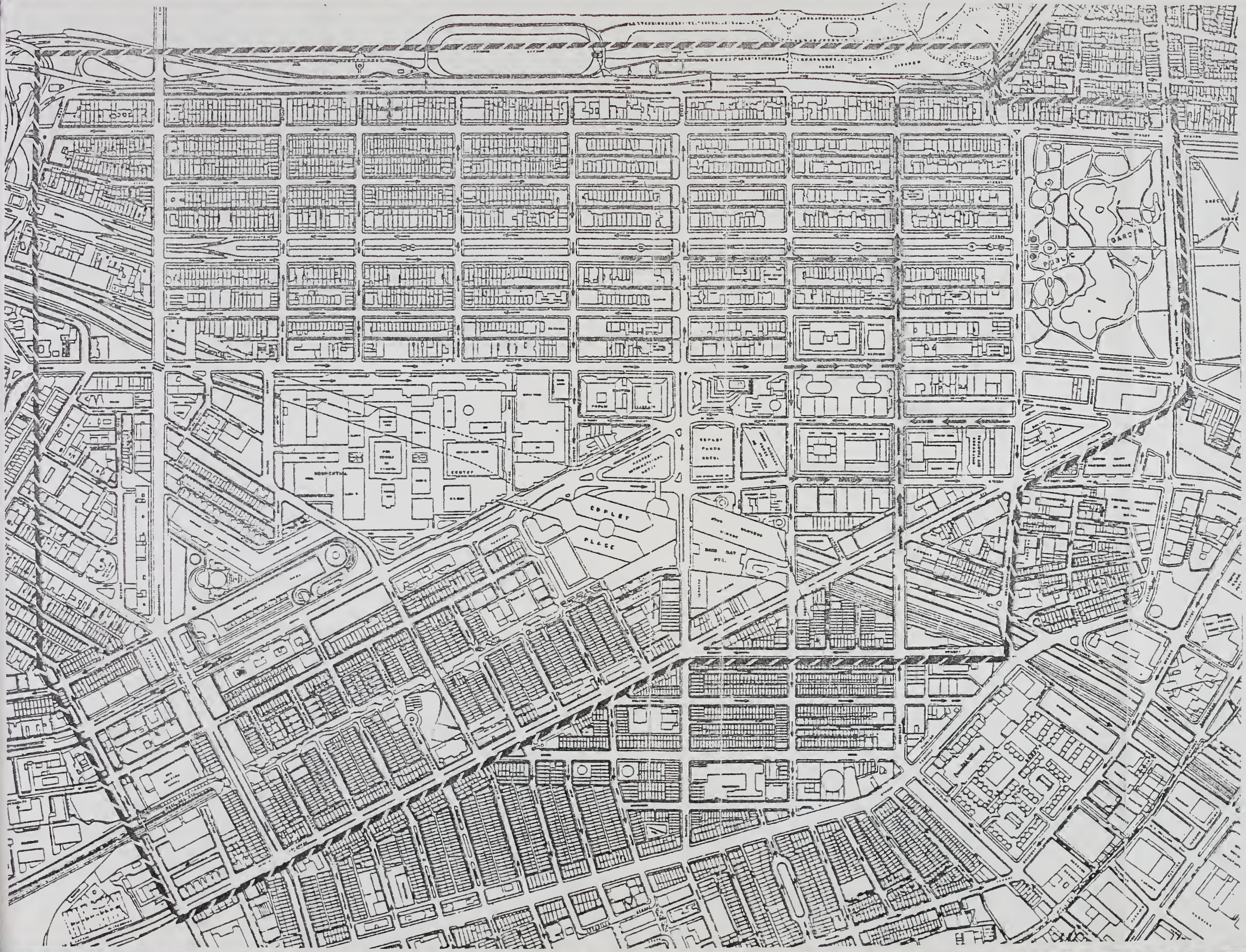
STORROW DRIVE CLOSURE ALTERNATIVES: TRAFFIC DIVERSIONS



Storrow Drive West:

Existing Routing

Study Area Boundary



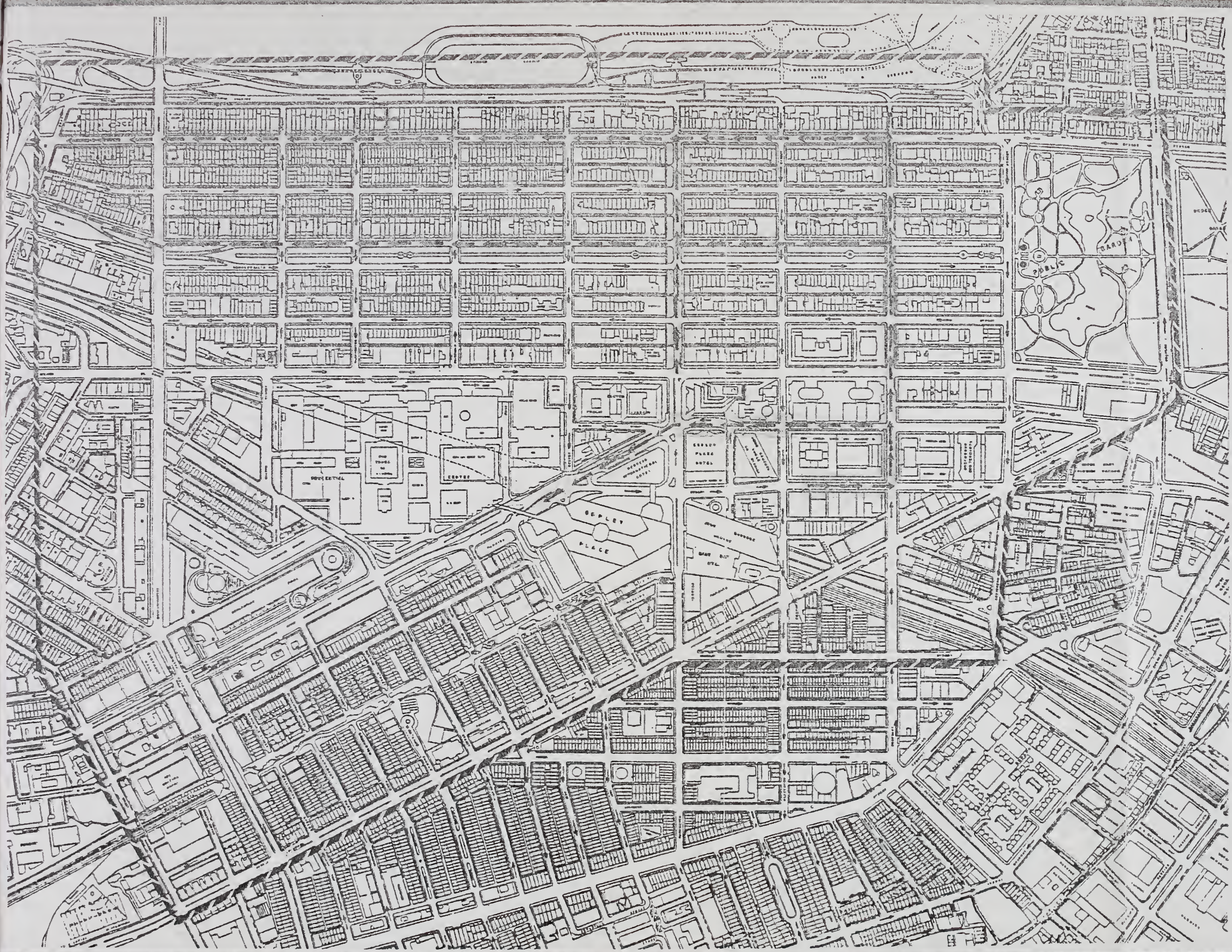
Storrow Drive East:

Existing Routing

▰▰ Study Area Boundary

0 250 500

Approx Scale in Feet



Diversion with

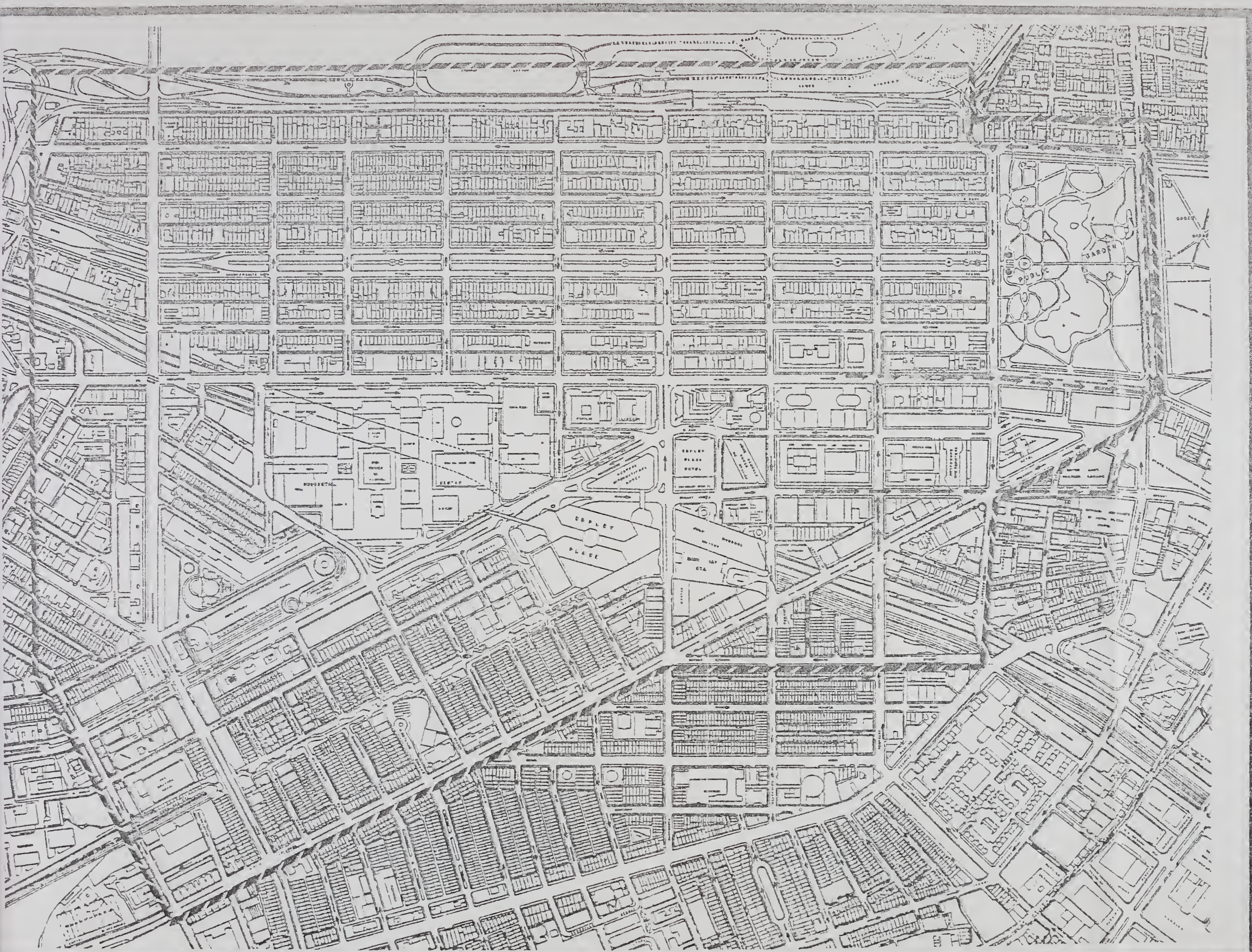
Storrow Drive West

Access Closed

▰▰ Study Area Boundary

0 250 500

Approx Scale in Feet



Diversion with

Storrow Drive East

Access Closed

▬ Study Area
Boundary